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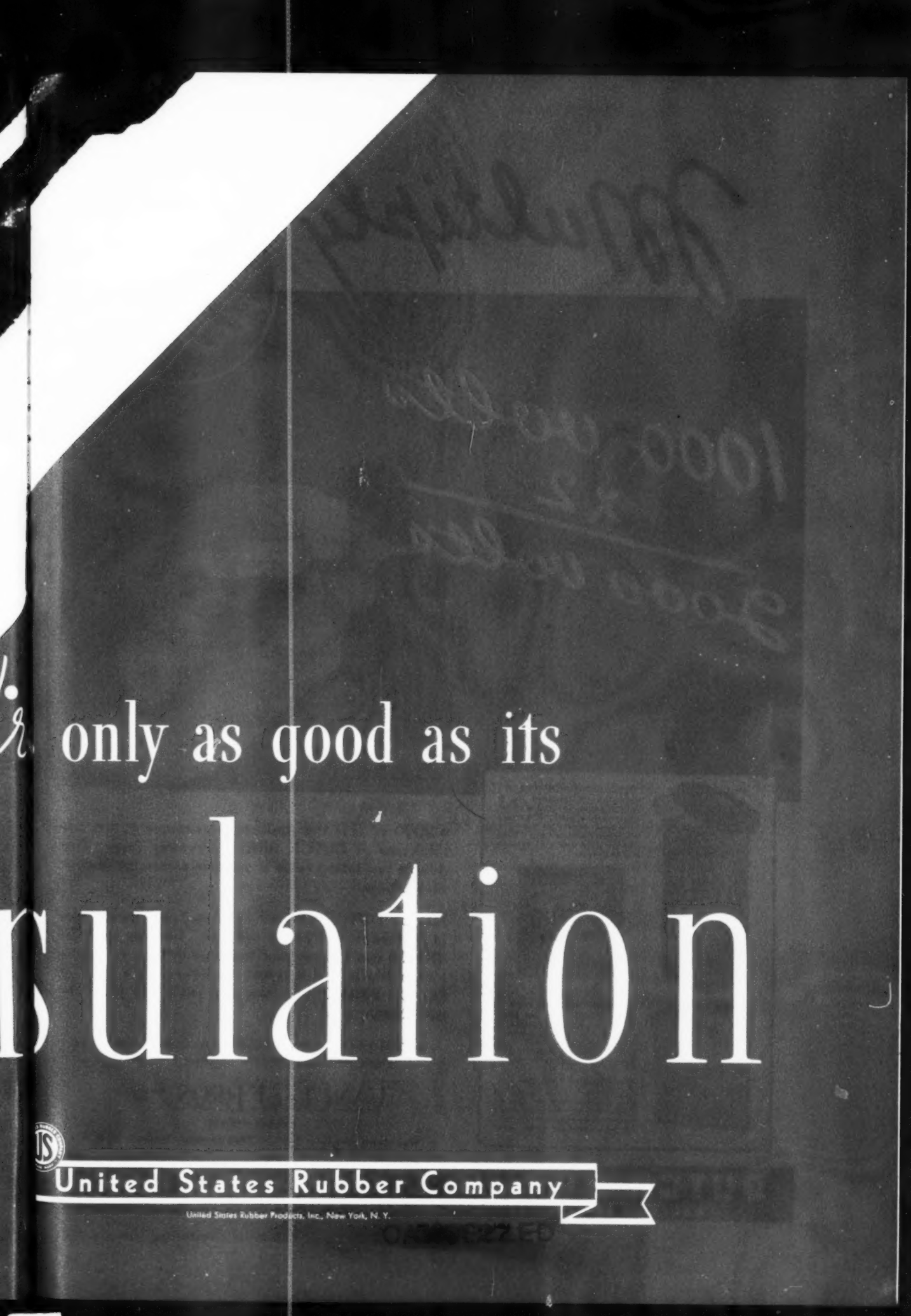
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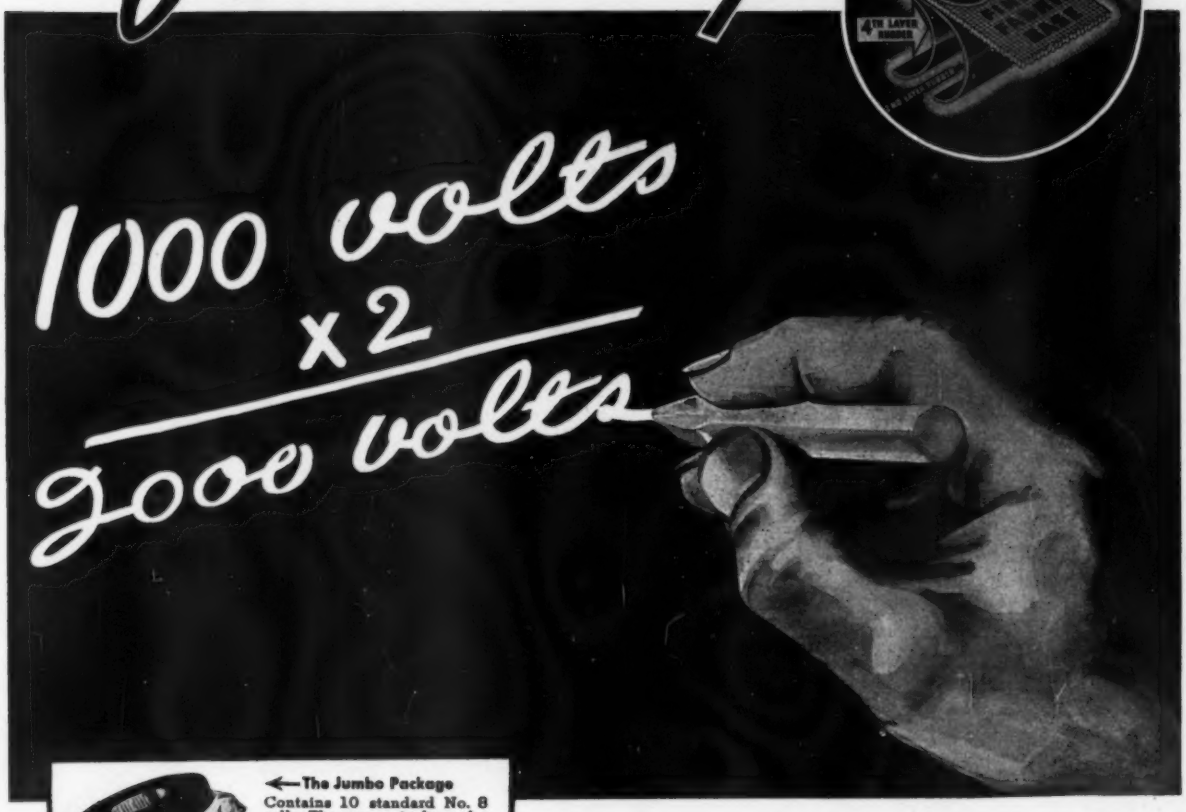

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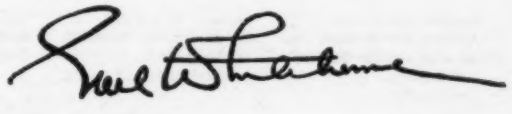
WHEN I WAS A LAD in a small Jersey town, kerosene gave us light. Pot bellied coal stoves gave us heat. We pumped our water in the kitchen. And our plumbing was a little red house by the wood pile.

THEN CAME THE GREAT AMERICAN ADVENTURE in Home Comfort. All at once, electric light, central heating and porcelain bathtubs made almost every dwelling in the country old fashioned and out of date. And suddenly, in the nineties, a wave of house building swept across the land, and wrought a revolution in our living standards. I remember it well.

ANOTHER SUCH WAVE is now about to break loose. We are underbuilt by two million dwellings. And a new combination of modern improvements is working up a tremendous pressure for new homes that will soon tear through the crumbling dam of the dying depression. Air conditioning, oil and gas heating, insulated walls and electric kitchens have united to render most of the homes in America obsolete. History repeats itself and returning confidence tempts each family to do something about it and enjoy these modern good things of life.

SO THE GREATEST BUILDING BOOM the world has ever seen will soon be upon us. For, to satisfy the markets this will create, a secondary boom in factory construction will develop. And along with that will come a major movement in commercial and industrial modernization. And all of it means more electrical equipment.

THE ELECTRICAL CONTRACTOR is facing the rising sun of a new prosperity, richer than he has ever known or dreamed about. As America rebuilds, it must rewire and he must do the work. Progress waits upon it. The whole future of the electrical industry hangs upon it. His day has come!



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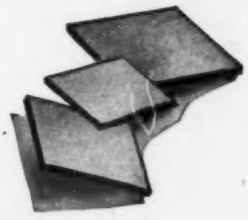

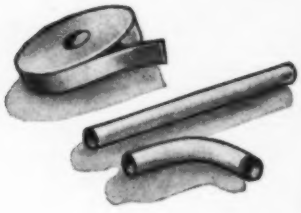

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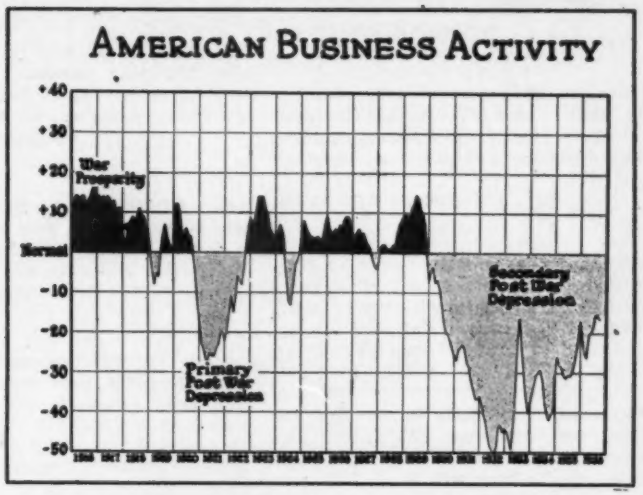


After each great war it is the same. The "Secondary Depression" is the worst — then up she goes. And we are there!

1937...

A GOOD NEW YEAR!

At last the flood tide of good times is flowing back over the land. After the deepest, longest, hardest depression in our history, the business cycle is swinging up toward normal, into a new prosperity. It is acting exactly as it did in those other depressions following the Revolution, the War of 1812 and the Civil War. History again repeats itself.

So this good new year of 1937 is a good time to be alive and an electrical contractor. The volume of general business is rapidly swelling. Employment is increasing. Each quarter, as we read the corporation profit statements, it is just one chorus of glad tidings. Bigger dividends and extra dividends are jingling in millions of pockets. Consumption of electricity is soaring above the previous highs. Industrial, commercial and residential building is all piling up at once with wiring everywhere. *Look at the curves!*

Still Better Business Coming

The best assurance that all this holds a prospect of better profits and promise for the contracting industry, lies in the record of 1936. Here is the evidence, in the testimony of important contractors in the principal cities. It is an intimate informal round-up of the business outlook for the year ahead.

Boston—Our business in 1936 exceeded 1935 by 100%. Expect further increase of 33⅓% this year. Large private construction, bank work and industrial building ahead.

JAMES WILKINSON & CO.

New York—1936 was 50% better than 1935. This year will run 25% to 50% better than last. More industrial and commercial equipment and modernization, more "change-over" work.

BELMONT ELECTRIC CO.

Newark, N. J.—Construction work up 30% over last year. Good prospect for alterations and improvements, also small houses. New factories and larger houses fair.

DAVIS ELECTRIC CO.

Buffalo—30% improvement last year over 1935. Look for 50% increase this year. Industrial business most promising and modernization in commercial buildings.

McCARTHY BROS. & FORD

Baltimore—Business in 1936 about equals 1935. Look for 100% increase this year. Industrial, commercial and domestic wiring outlook good.

BRUECKMANN ELECTRIC CO.

Washington—Prospect here very encouraging, due to government's building program.

HARRY ALEXANDER, INC.

Toronto—Last year was 30% better than 1935. Expect 50% more in 1937. Industrial business shows remarkable growth. Commercial and domestic wiring increasing.

PATTERSON ELECTRIC, LTD.

Cleveland—Business last year 100% better than 1935. Outlook for 1937 very bright for both industrial and house wiring.

MARTIEN ELECTRIC CO.

Cincinnati—Our business 300% better than 1935. This year will run 50% greater. Residence building will double. Industrial and commercial gaining well.

BELTZHOOVER ELECTRIC CO.

Chicago—1936 exceeded 1935 with us by 35%. Look for further increase this year. Industrial business improving, domestic just starting, commercial slow.

WHITE CITY ELECTRIC CO.

Minneapolis—Last year better by 18% this year looks like 40% further gain. Outlook for residence wiring very good, industrial and commercial good.

HURD ELECTRIC CO.

Richmond, Va.—Business up 81% in 1936 over year before. We expect 25% increase this year. Industrial and commercial wiring will be up 25% and domestic 80%.

CHEWNING & WILMER, INC.

Charlotte—Last year brought 33⅓% increase over 1935. This year will bring further 33⅓%. Looks like gain of industrial 25%, commercial 33⅓%, domestic 50%.

ROBINSON ELECTRIC CO.

Chattanooga—Last year exceeded 1935 by 85%. Expect at least 65% increase over that this year. Industrial wiring will be up 40%, commercial and domestic 50%.

TEMPLE ELECTRIC CO.

Jacksonville—Our business has just doubled 1935 volume. We expect 50% increase in 1937.

HENDERSON'S ELECTRIC SHOP

Birmingham—Our volume exceeds last year by 50%. Outlook bright for 1937. Much industrial and residential shortage stored up and work now beginning.

MILL AND MINE CONST. CO.

Memphis—Volume was up 20% in 1936 over the year previous. We expect 10% more in 1937. Residential and apartment work will be most active.

FOWLER ELECTRIC CO.

New Orleans—Contracting business here 300% to 400% over 1935. Expect to double it this year. Industrial and commercial and domestic improving.

ENTERPRISE ELECTRICAL CO.

Dallas—Our 1936 business totaled 64% more than the year before. Expect 25% more volume in 1937. Domestic wiring should be 60% up and other classes very good.

R. FISCHL ELECTRIC CO.

Houston—Our total 60% last year over 1935. Expect 20% improvement this year. Industrial wiring should gain 30% and domestic 40%.

HOOD ELECTRIC CO

Phoenix—More than 18% increase over 1935 and outlook for this year 50% better. Main volume will be residential with industrial improvement also.

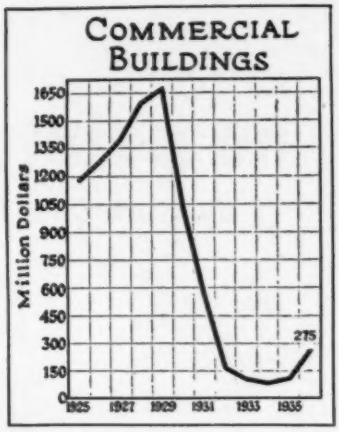
BACON ELECTRIC CO.

Milwaukee—Business was 50% up over 1935. Look for 25% more in 1937. Large increase in new residences. Good industrial and commercial outlook.

MAGAW ELECTRIC CO.

Denver—Increase of 30% in 1936 volume over year before. Expect 40% advance this year. Commercial outlook excellent, domestic very good.

STURGEON ELECTRIC CO.



Omaha—Business running about the same as 1935. Electrical work still quiet here.

THOMAS C. MUSTAIN

Salt Lake City—Our total business last year 300% above 1935. Should be at least 200% increase this year. All kinds of construction looks 100% better.

ROBERT R. REID ELECTRIC CO.

Seattle—Last year increased total billing 42%. This year will bring 25% or more improvement. Outlook — commercial excellent, industrial good, domestic fair.

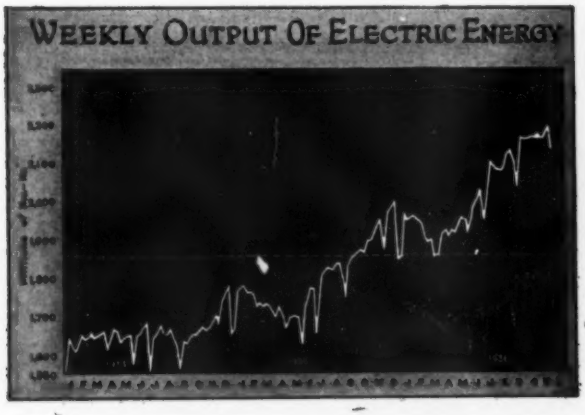
ARROW ELECTRIC CO.

San Francisco—Totaled 62% more business in 1936 than in 1935. This year looks like 50% gain. Industrial, commercial, domestic wiring best in years.

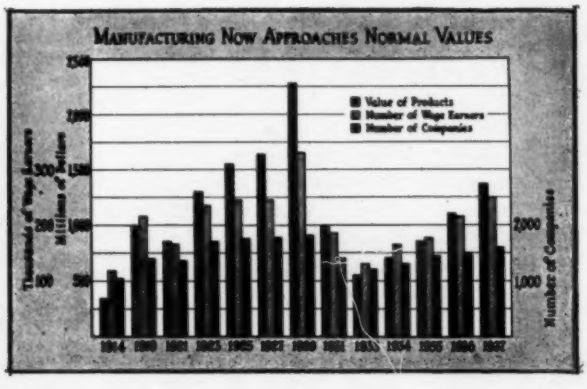
CALIFORNIA ELECTRICAL CONSTRUCTION CO.

Los Angeles—Last year totaled 35% higher in sales than 1935. Expect this year to be at least 25% better. Wiring of all kinds exceptionally good.

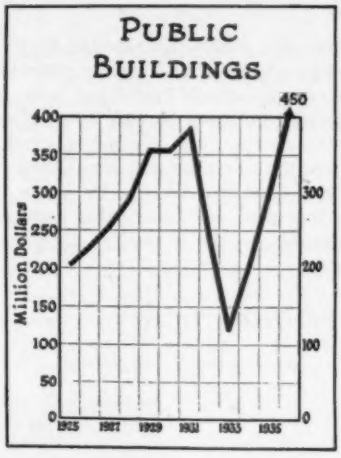
STONE ELECTRIC SUPPLY CO.

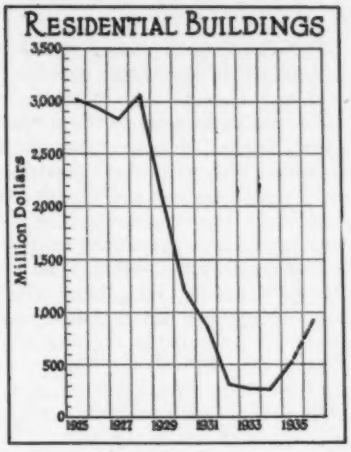


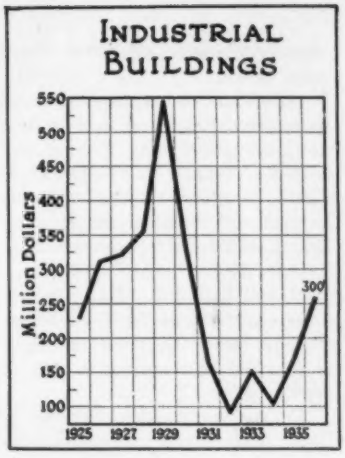
Energy output now tops the boom peak of 1929. And all this extra load, thrown onto inadequate wiring,



With the steadily swelling demand for electrical materials and equipment, electrical manufacturing production, too, is rising again to normal levels.







Public building construction began climbing in 1933, commercial and industrial in 1934. Now residential building starts to skyrocket. All but public buildings will continue to increase this year — MORE WIRING EVERYWHERE!

Interesting PROBLEMS Ahead

With more volume and better business will come new problems. That makes life interesting. Out of the solving of these problems the contractor will readjust himself to his expanding opportunity and the new conditions of the new world we are working in.

Some of these problems—the more important, the more urgent of them—are discussed in the following brief statements by men whose advice in these matters is worth taking. And the important point is this—that these issues are not just national. They are also local in their influence. They concern each individual contractor.

Industry opinion and organized national policy grow out of what the individual contractor thinks and does. Therefore, these problems are your problems.

BUILDING MARKETS

National and Local

By
EARL
N. PEAK

President, National Electrical Contractors Assn.

INDICATIONS are plain that the electrical industry faces immediate business expansion of great promise. Increased building, rural electrification, air conditioning, kitchen modernizing, better lighting, household appliances, adequate wiring, improved finance plans are all influences combining to build up a greater pressure on the market. And the market is growing steadily easier to sell.

In the history of the electrical industry there has never been a time when there was a greater need for industry coordination and cooperation than there is today. It is for this reason that leaders of the four major associations have organized the Electrical Industry Promotion Committee, hoping that better inter-industry relations may be developed both nationally and locally to bring better business for all.

This committee will examine promotion plans and programs prepared by any association, and where they merit it, bring the united and wholehearted support of the industry behind them. It will also promote local groups representing all branches of the industry, to secure better cooperation in local business development. A number of such organizations have already been created and have programs under way.

There are now in existence numerous electrical leagues, many of which are actively promoting local or national campaigns with marked success. Others are luncheon clubs, which could form the nucleus for expansion into market building organizations. Whether the group be called a league or bureau or committee is not important. The existence of such a local cooperative group *is* important. The vital thing is that the opportunity is here now for promoting sales campaigns, both local and national, developed and coordinated by a national cooperative headquarters. We also have a basis for bringing industry leaders together to exchange views and dis-

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cuss problems affecting industry team work.

Individual markets often require specialized programs and what these are and when they should be promoted will vary in respective localities. In general, the broader the market and the sales effort to sell it, the greater will be the ultimate benefit both to the public and the electrical industry. But whether the program be local and restricted in its objective, or national in scope and broad in purpose, a local cooperative group is vital.

Among the local programs which have been given consideration and which have promise for all, is an outlet campaign, using new and approved wiring methods which permit of the installation of convenience outlets upon an economical basis, thereby eliminating millions of feet of undesirable cords from the homes and offices. There are also programs of home ventilating, attic ventilating, forced air heating and highway lighting.

The first step is for each city or town to set up its own local coordinating committee and start to work. Full information as to how to organize locally may be obtained from the Electrical Industry Promotion Committee.

ADEQUATE WIRING

The Next Objective

By
GEORGE C. THOMAS, Jr.

Vice-President, Thomas and Betts Co.
Chairman, NEMA Adequate Wiring Promotion Committee

FOR lack of a better term, it would seem to me that the average American home of today is suffering from "electrical arterio sclerosis"; in other words, inadequacy of the arteries. As a child grows up, his arterial system also automatically increases in capacity supplying more blood to all parts of the body. But in the arterial system of the home, unfortunately the electrical wiring does not automatically expand.

The child as it grows wants the joys of eating and better muscles for running, baseball or football; yet never thinks that all of these things are made possible only if the arterial system is adequate. So it is with the American home owner of today, who electrically is still a child. It is very easy for him to appreciate and want a modern electrified kitchen, an electric refrigerator, fans, better lighting and all the other useful appliances. But, knowing nothing about it, it is very difficult for him to realize that these things are made possible only if the wiring in his home expands with his equipment.

Relief Long Needed

The electrical industry has known for years that this situation was growing more acute, and much good work has been done to remedy the condition — but not enough. The National Electrical Manufacturers Association has now approved a fund to develop a national adequate wiring program in the residential field. It fully senses the complexity of the problem and recognizes that the cooperation of every branch of the industry is essential, if the program is to be soundly developed.

Any such activity necessarily will produce increased work for the electrical contractors, and increased volume of business for the manufacturers, distributors and utilities. But there is an even more important objective in this activity, the safeguarding of the health, comfort, and safety of the public. And just as the medical profession feels an obligation to instruct the public in maintaining proper health, so we in the electrical industry ought to feel the same obligation to help the public put homes in healthy electrical condition.

For all of these reasons, we earnestly seek the cooperation of every branch of the industry in carrying out a national program for adequate wiring. And every man or woman in the electrical industry is dependent upon putting this adequate wiring program across to insure his own bread and butter and future comforts and should be willing to help.

Our effort will be to prepare and follow up a national program which will bring this realization to the electrical industry, by developing a public understanding of and desire for adequate wiring through publicity and cooperation with all organizations in the industry. In this program, the contractor should play a large part, as in addition to estimating, engineering, installing and financing, he must be also the industry's salesman and contact with the prospective and present home owner.

The Adequate Wiring Program is on its way, and with the help of everyone in the industry, is going across.

CITY INSPECTION

Seriously Threatened

By
RALPH W. WILEY

Chief, Dept. of Electricity, San Francisco
President, International Assn. of Electrical Inspectors

PRACTICALLY every inspection department in the United States was called upon to reduce its personnel after the crash in 1929 and during the years that have intervened. Now the demand upon the inspectors is steadily increasing and we are rapidly heading into a serious situation.

An undermanned inspection bureau cannot possibly give the service the electrical contractor and the public are entitled to and the one man who will be most disastrously affected is the contractor. Therefore, in my opinion, contractors should take a very active part in every city in helping all such undermanned inspection bureaus to obtain an increase in force.

Those who have had experience with federal, state, county and municipal governments, and I might add the various insurance rating bureaus, will agree with me that the officials responsible for yearly budgets are always eager to see a cut in cost. But it is hard to make them see the necessity of enlarging the force, as the increase in building and improvement in conditions demand.

I think it is obvious to every one, however, that we are facing a critical situation if additional inspectors are not employed to keep pace with the tremendous growth in electrical installations. And these will be made in increasing numbers in the very

near future. If no class of installation is considered other than rural electrification, this alone should be sufficient to justify a movement for stricter supervision.

I am a strong believer in cooperation and I feel that the electrical industry should come to the aid of the inspectors in this situation. Without an adequate inspection service the electrical contractor, jobber, wholesaler and the power company are all adversely affected. But the contractor suffers the most. Therefore, it is vital for the well being of all branches of the electrical industry, that inspection should not break down in the face of the great need that lies ahead.

I hope that all groups of electrical men will lend their support to the International Association of Electrical Inspectors in their efforts in behalf of the local inspection bureaus. Certainly every contractor should do his utmost in his own city to convince the authorities of this need and build public opinion for it. The shortage of personnel will be acute in 1937.

THE OPEN ROAD
To Rural Wiring

By
WILLIAM
A. RITT

Secretary-Manager, Minnesota Electrical Council, Minneapolis

RURAL electrification was well under way in 1929 when business collapsed. Most of it centered in cities of 5,000 or less and the contractors then found this country market wrecked, and some dubious accounts on their hands, with no work in town.

Most larger contractors are not interested in wiring farms and rural homes. But smaller contractors, experienced in rural wiring, are again getting their necks out of water and will be able to build this business back, as a few unfavorable factors are corrected—

1. Good contractors want to be assured of making expenses and eliminating all possible risk. They do not want to repeat the 1929-30 experience.

2. Political promotion of rural electrification has been disquieting. Enthusiasts have told the farmers that wiring costs would be cut ⅓ to ½ under cooperative bargaining. Edison Electric Institute recently published figures showing an average of $69, which does not fit the type of farms in Minnesota, at all.

The Worst Curse

3. Announcement of a rural line extension immediately brings forth a flood of mail order electricians, high school boys and farm lads, all offering to bid and install. And they do so with fantastic prices and results. A recent sample included some duplex wire of doubtful vintage, with the outer braid painted to resemble non-metallic sheath cable.

But experience is steadily ironing out these difficulties. Farmers are finding out that "anybody" cannot do a good wiring job, and that bargain prices frequently mean tearing out the work and doing it over before the current can be turned on. Much work has been lost, but only temporarily. It will provide the responsible contractor much work later on, with little haggling over price and a lot of insistence on adequacy.

Meanwhile, there are some things for the industry to do—

4. The contractor should insist that his suppliers, the manufacturers and utilities should wage an educational campaign to sell better farm wiring and equipment and expose the fallacies of improper materials, careless workmanship and inadequate installations.

5. Contractors who want rural work must keep themselves informed and ready to do good work and keep close contact with the utility groups that are developing rural electrification.

Be a Good Salesman

6. Contractors should tie into local, state or national association programs that are assisting in this movement.

7. But most of all, to land this business you must be a good salesman, a practical engineer, a skilled workman. Many farmers today are agricultural college graduates. Many attend short courses. Some already know more about farm electrification than many contractors. They like to deal with a good salesman, who is responsible, a man who can sell and install the complete job and assume responsibility, for servicing the equipment as well as the wiring.

Salesmanship is the contractor's greatest need in this market. You must be able to put yourself in the farmer's boots and talk horse sense in simple language. You must know your business and your product and your service and then sell it at the right price. And you can get the right price as easily as the auto and tractor dealer if you show the farmer that he will get value.

IMPENDING LEGISLATION
—What to Do

By
R. BOURKE
CORCORAN

Director Regulatory Legislation Dept. National Association of Manufacturers

EVER since the first central station began operation in 1881, the electrical industry has been subjected to a vast and increasing amount of complicated regulatory legislation.

Two years ago, 29 electrical bills were introduced in 22 states and three were enacted. This year practically all of the state legislatures will again be in session and an even greater number of electrical bills will probably be presented to the various legislatures. They will embrace all forms of licensing, electrical inspection and regulation of the sale of certain electrical products.

In over 700 municipalities throughout the country, regulatory ordinances have been adopted. Many of these have been needlessly restrictive and have curtailed the amount of business actually enjoyed by the various branches of the industry. Some have been fostered by men who believe they can legislate their legitimate competitors out of the way, or that they can build a Chinese Wall about themselves and gain a monopoly over a particular business.

As Earl Peak, President of NECA has pointed out, this has deprived the electrical contractor of a vast amount of business. Many surveys have shown that because of these restrictions the contractors are now ob-

taining only from 20% to 40% of the available work.

Any student of this situation can easily observe that such methods are sheer folly. No legislation should be sponsored which serves, even temporarily, as a special advantage for any particular interest. No local ordinance or state statute should be promoted unless it has the wholehearted support, not only of all branches of the electrical industry, in the community concerned, but of the customers of the industry who are affected by it.

The National Electrical Manufacturers Association does not sponsor or promote legislation. Its Regulatory Legislation Department merely makes an earnest attempt to study all existing regulatory legislation and maintains a comprehensive laboratory of experience gained in the field throughout the country. We are interested in seeing that legislation maintains a free and open market for all standard products made by our members, knowing that only through mass production can lower prices be obtained.

So our staff is available to confer with those working on legislative matters, to give them the benefit of our experience. For if groups sponsoring legislation are aware of the fallacy of needless regulation and that which is needed is in proper legal form and uniform, then all branches of the industry can better serve their customers.

MAKE CREATIVE SELLING

More Profitable

By
E. C.
CARLSON

President, Carlson Electric Co.
Youngstown, O.

THERE are two kinds of selling in which a contractor may engage. Competitive Selling is required to secure the contract for an installation, where wiring is made necessary, because a building is being erected or remodeled, or where machinery is being installed. Creative Selling convinces a prospective customer that he needs new or additional wiring or equipment requiring wiring, and secures the order. Every Contractor does more or less competitive selling, very few do creative selling.

Competitive selling does not increase the total volume of business transacted by our industry. It merely determines which member of our industry will transact business which was really created by the person who sold the idea that brought about the erection or alteration of a building, or a change in a manufacturing process. It follows therefore that if the sales volume of our industry is to be increased over and above that which is laid in our laps by others, we must do creative selling.

Better Work Worth More

But this kind of business development requires a higher type of salesmanship than is necessary for competitive selling. It requires more engineering knowledge. The way must be paved for the salesman by proper advertising. It requires constructive long range planning, such as can be done only by a concern with adequate financial resources. It costs a great deal more to produce creative sales than it does to produce competitive sales.

All of this brings us to the logical conclusion that if the electrical manufacturers would like to have from 10,000 to 15,000 creative salesmen working for them on a strictly commission basis, they can do so. They need only require their wholesalers to maintain an adequate differential for the contractor-dealer in their price and discount schedules.

I can see no reason why each manufacturer cannot develop for himself a plan whereby he can determine who are "Qualified Contractors" entitled to be compensated for the services which they render in the sale of his product. Perhaps contracts between individual manufacturers and individual contractors, might be the answer, providing for additional compensation only after satisfactory sales service has been rendered to the manufacturer.

As it is the discount intended for contractors is the maximum discount offered by the wholesaler to all comers and the quantity provisions set up by the manufacturer are disregarded. As a result, many electrical contractors now assume that their sole economic function is to sell and manage skilled labor hours.

In making these criticisms of other branches of the industry I am not unmindful of the criticisms which are justly due the contractor. I want to see the decent elements of the electrical industry lined up on one side of the fence, with the unscrupulous, dishonest, ignorant and unsportsmanlike elements on the other side. And the forces of fair dealing will prevail.

In the period directly ahead, the contractor will have a great opportunity for the development of his market. But it is a certainty that the sales ability required for large scale creative selling will never appear in the electrical contracting industry until such time as creative selling becomes profitable.

RE-MANNING

The Technical Staff

By
R. H.
BOULIGNY

President, R. H. Bouligny, Inc.
Charlotte, N. C.

CONTRACTORS are now facing a real difficulty in re-manning their technical staffs. During the depression they were compelled to let valuable engineers, estimators and draftsmen go. Now big work is coming back and these departments are short handed. The problem is—What type of men should be hired, where can they be found?

I am of the opinion that sufficient men with technical education are available today, but the trouble is to pick up men with experience. Practical knowledge is necessary if they are to fill these positions. Apparently it is going to be necessary to put a large number of men into training as rapidly as possible, if they are to be ready as the volume of building increases.

The fact that there is also a scarcity of journeymen electricians may provide a method of relieving both conditions. My thought is that a great many graduates of technical schools now recognize the necessity of getting into the practical end of

the business, and during the past few years a large number of them have been working with tools.

There is a chance, therefore, for electrical contractors to help these men and benefit themselves by taking them on in their construction organizations. I have found that if these men are picked with care they can advance rapidly in construction work and will make better men in the technical end of the business, for having received this experience.

Because for the past six years so few helpers or apprentices have been employed by the contracting industry, something of this kind will have to be done. A great many of the older men, who went into other lines of work when we let them go, still hesitate to return to contracting.

They want to be sure that building has really begun again in a big way and confident that they will receive steady employment. Meanwhile, the contractors need wiremen. And if they take on good candidates for the technical staff and train them, they should be ready for staff work as the old men begin to drift back.

THE CONTRACTOR'S PART

In Reinspection

By
CHARLES
K. CREGIER

Chief Electrical Inspector
Chicago, Ill.

EVERYONE in the electrical industry realizes the need for reinspections of antiquated electrical equipment and wiring installations. But what about the city authorities who legalize the supervision of electrical installations? These officials do not appreciate the need.

The necessity for reinspections can be shown by concrete examples of conditions found in almost all large cities. Ordinary wiring installations are used in rooms or buildings where operations are now performed that cause the space to be classed as a hazardous location. Increased use of electrical equipment and larger lighting units are operating on unauthorized installations of wiring. Additions to old wiring are causing overloads on services, mains and circuits with the resultant overfusing and replacing of fuses with solid conductors. And there is much wiring, damaged by fire, water or mechanical injury, that is kept in service by people who do not realize the danger in so doing.

How to Get It Done

There are various ways to approach this job of reinspection—

1. Employ a separate form for reinspection only, designed to assist the inspector in checking all items.

2. Treat reinspection as a special job and put the plan in operation, with men selected for their practical knowledge of the subject, their diplomacy and good common sense.

3. Assign the several inspectors to cover the entire city, thus avoiding in any district a feeling of being picked on, or any injustice that might result from a partial coverage of any adjacent area. Reinspections by the regular district men are not satisfactory and may result in partial coverage due to slighting of reinspections in favor of their regular duties.

The inspector, of course, must not fail to distinguish between wiring installed in conformity with previous code rules and wiring installed without a permit or code authority. Wiring installed under previous code rules, that is still in good safe condition, should not be condemned and in some cases minor repairs should be permitted following old code requirements. But replacement of old wiring with new wiring, wholly or in part, should be done according to present requirements. Hazardous conditions in wiring and equipment should be condemned without fail.

Make No Enemies

The inspector and contractor should avoid arousing any personal feeling due to the compulsory nature of the job, and try in every way to convince the owner that the proposed changes are to his advantage, in providing safety to life and property. They must not permit the opinion to form in the owner's or user's mind that he is being persecuted or made the victim of a racket to create work for the contractors.

The contractor can be a great help in establishing permanent reinspection in any city. He should work for the adoption of the necessary ordinances and when estimating a reinspection job, always advise the owner that the inspection authority is asking for the minimum requirements only. The contractor can also promote the success of the plan by impressing upon his customer that he is primarily interested in the proper functioning of the wiring and equipment and in the completion of the job in a manner that is satisfactory to the customer and the inspection authority, guided solely by established code requirements. He should not be chiefly interested in his profits, or the selling of some particular manufacturer's equipment or in increasing the amount of wiring that he can convince the owner must be done. The contractor has a great responsibility in the promotion of this important public service.

THE ANSWER

To Skilled Labor Shortage

By
WALTER
F. SIMON

Supervisor of Apprenticeship
Industrial Commission of Wisconsin
Madison, Wis.

ELECTRICAL contractors are concerned over the shortage of skilled men of their trade. But there is no quick way of relieving this shortage. The only answer is a long time apprentice training program and eventually the electrical industry will have to come to it. Meanwhile, there are a few conditions that might well receive some serious thought.

1. The average electrical contractor in America is not apprentice-minded, simply because he himself never served a regular apprenticeship. He seems to think that mere employment ends his obligation and that it is the learner's fault if he fails.

2. Where there exists no indenture or agreement between the employer and apprentice, the obligations of apprenticeship are rarely carried out. There must be a formal contract specifying term, schedule of training and wage rate.

3. Skilled men cannot successfully be trained in trade schools. The place to learn a trade is on the job.

4. A licensing law never has and never will raise the standards of skill very much for the contractor. It may temporarily prevent the gravely incompetent from holding themselves out as skilled workers, but that is all. No plan can succeed if the wrong boys are hired. And there must be contact between employer and learner throughout the period of training.

5. Neither industry, organized labor nor the educators, working independently, can bring about successful apprentice training. If you want proof, look at the increasing scarcity of skilled labor in all the crafts, the demoralized standards of skill and the untold number of unemployed young men. There must be an organized cooperation between the several interested groups.

6. To promote a program of apprenticeship for the electrical contracting industry, somebody must make it his sole business, and men competent to do this are few. Also the program must be supported by an institute of some sort where apprenticeship administrators can be trained.

7. State apprenticeship legislation is necessary and advisable if it is used as a protection for the learner in industry. I believe all states will come to it once the importance of apprenticeship is recognized.

As long as apprentice training remains just another national problem it is nobody's business and no permanent solution for the present and prospective shortage of skilled labor will be found. It must be looked upon as a local need first of all, and the contractors and the unions should come to an understanding on a real apprenticeship plan and incorporate the plan in their working agreement. The support of organized labor is necessary and can be obtained.

The Federal Committee in Apprentice Training is now at work in Washington with a program that is really the Wisconsin Plan, modified to fit other states that lack apprenticeship legislation. The plan contemplates uniform standards and trade committees of employees and journeymen in each state or city. For immediate results, I believe this is the best bet and I recommend it to electrical contractors for study.

TO REVITALIZE

Local Cooperation

By
C. S.
BOGER

Secretary, Carolinas' Association of Electrical Contractors Charlotte, N. C.

HARD times have beaten down many of the local contractors' associations. And now that good times are back once more, we must build them up again. They are vital to the progress of the industry and there is no way to restore them but re-establish local cooperation.

The formula is simple. The National Electrical Contractors Association has already divided the United States and Canada into districts. Where these districts are not now functioning, we must organize state associations and out of them the local associations and then coordinate both with each other and with the national body. Where local associations exist with no state body, then it is best to build the state organization out of them.

In North and South Carolina 90 per cent of the electrical contractors do an annual business less than $25,000 gross a year. These men will not seek organization and protection. The association must seek them. It has been necessary, therefore, to build a strong state association first and then to organize the local groups. National cooperation must follow as the final step.

It is toward this end we have been successfully working in the Carolinas. And we believe that the most vital part of the work is the uniting of that 90 per cent of small contractors in cooperative activity for self improvement and industry progress.

The question of personal leadership is difficult but vital. Every group must be headed by a man who believes whole-heartedly in association as the best method of individual and collective aid. He must also have proper educational and character qualifications and a will to work. Moreover every local and state association should be autonomous and capable of functioning by itself without aid or interference from state or national bodies. Only then can intergroup cooperation become most effective.

There is nothing new about this, but there is also nothing old. The principles of organized cooperation are unchanged. The important thing is that the members of each group understand what the industry is working for and why, and take their place in the program and do their part. Therefore, the great need is for clear policies, constructive purpose and enough contact so that the strength of unity can be marshalled behind the things we want to accomplish in behalf of the industry and in the service of the public. Association work should be intensified this year.

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1

Expert machine operations and arc welding are shown here as a part of the routine in shaft repairs, making or repairing bases, brackets, cutting keyways and other important work.

A Shop THAT Sells Itself

Out in Oakland Is a Motor Repair Shop Organized to Bring Work In As Well as Turn It Out.

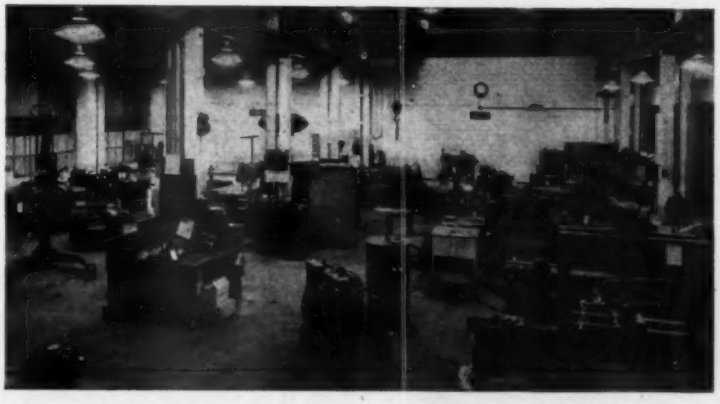
It's All Done With Pictures. Here's the Story.

PEOPLE in Oakland have been in the habit of going across the bay to San Francisco for their important buying, with their big jobs. It made a problem for the Pacific Electric Motor Company. Their shop in Oakland is equipped to tackle any kind of motor work that can be handled in San Francisco. But the local industries did not know it. The Pacific company decided to show their shop to their customers and make them realize that all the facilities and skill that they could need for any emergency was ready at hand. They did it with pictures.

The shop is modern, efficient and fast, arranged to save labor, shorten time and cut cost. So they painted and polished it up and put it on parade before a photographer. They made a show place of that shop and then took the show to the customer. It was a smart idea and it worked.

Salesmen were equipped with portfolios of photographs that "take the shop to the buyer's desk," as they put it. So the busy factory executive, who has no time to visit the Pacific plant and see how they are fixed to do his work, looks them over and is surprised and convinced. He sees that this kind of a shop can do speedy, economical and expert work. Carrying the idea further, a house organ called "Industrial Electric News" is sent to all Oakland motor users. It shows more pictures of shop operations and interesting work done by the industrial wiring department.

Walter Vance, president, and Frank E. Boyd, general manager of the Pacific Electric Motor Company, believe that there are sound reasons why an efficient well managed local shop should do the work of local industries. It should cost the customer less and give him better service to get his work done in town, than to send it outside. They believe the customer will prefer to use a local shop once he has confidence in its resources, facilities and service. So they show him the plant in pictures and lay down the follow-



2 *This general view of a section of the shop suggests the efficiency that comes with good lighting, cleanliness and an orderly production arrangement and shows readiness to serve.*

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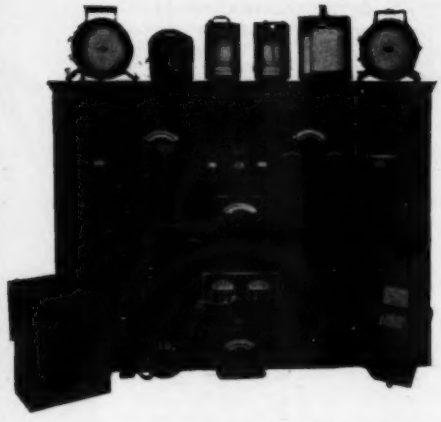
3 *In this corner, with its hot bath and solvents, customer work is assured of thorough cleaning, without risk of damage. An important service feature.*



6 *For tests and plant surveys, a complete equipment of indicating and recording instruments are at hand — several thousand dollars' worth — also experts to use them correctly.*

4 *Analyzing a motor's performance needs precision and the most favorable working conditions. This view of the testing equipment, includes a portable resistor outfit for use anywhere in the shop.*

5 *The stock room that supports the shop is a strong sales argument. It prevents delays and speeds up replacements. Note the bag racks handy to the shelves.*

ing reasons why the Pacific Company should have their work—

1. Production facilities are designed to handle all kinds of motor service shop work locally.
2. No time is lost to customers who might otherwise send their work out of town.
3. Expert personnel is trained to speedy and precise workmanship with the modern equipment available.
4. Red tape is eliminated in all transactions to give the customer quick decisions and fast production in all emergencies.

They demonstrate that they can turn out work at reasonable cost, consistent with high quality because—

5. Material purchases are based on a large volume of business.
6. Accurate control and responsibility on all work performed prevents all waste and excess material charges.
7. Direct supervision of labor is provided on each operation.
8. Trained engineering talent is available to design and supervise all technical and special work.

The views of the plant shown here are part of the Pacific salesman's pictorial sales presentation. With them it is possible to present a detailed explanation of efficient production methods and facilities, in a way

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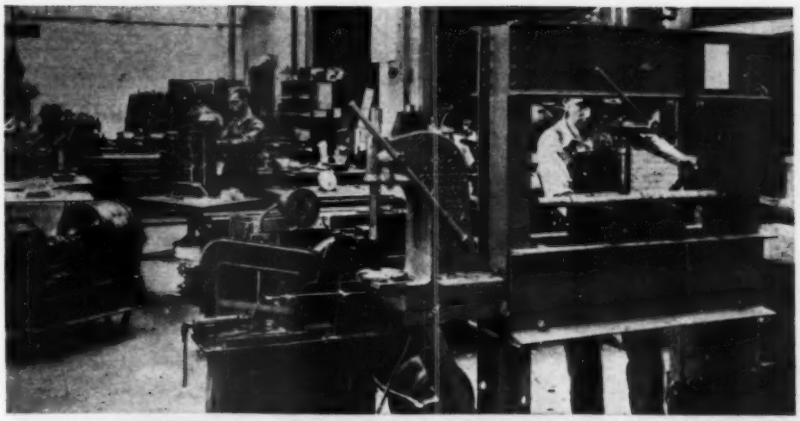
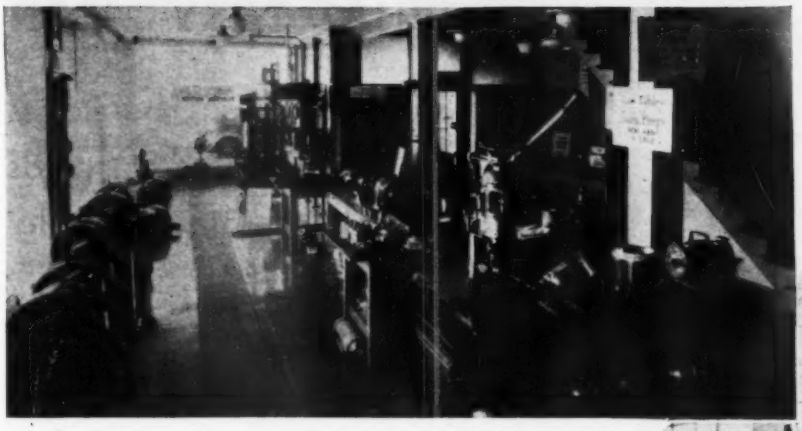


7

Presenting this 60-ton hydraulic press, ready to straighten shafts, force bearings in or out, or rotors on or off shafts for any customer.

8

Here a gas forge and torches speed up metal cutting, brazing of parts, pre-heating and melting. An impressive diversity of specialized services.



9

Equipment displays at the front entrance are changed regularly to include features of interest and serve as a show window for the shop. Lighting is provided at 3 watts per square foot demand.

10

Below: This picture features facilities for doing miscellaneous repair work on control panels and re-winding. Note the ingenious adjustable, all metal rack, for working on rotors.

that cannot help but impress the buyer favorably. Whether it be a rewind job, a bit of welding, some difficult machine work, important tests, or a matter of stock-carrying facilities in general, there are good photographs to demonstrate how well this company is equipped.

Here then is a growing organization that recognizes a need for doing more than a good production job. And by selling its prestige to those in its trade area, this company has maintained a consistent record of black ink, during times when industrial work was almost at a standstill. A steady program of publicity serves to maintain a steady flow of profitable business.

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A corner In the New York Test Room Of the Underwriters' Laboratories.

Electrical Standards

. . . WHAT THEY MEAN

How the Underwriters' Laboratories Establish Standards For the Industry And Why

By H. B. Smith

Associate Electrical Engineer, Underwriters' Laboratories, Inc., New York, N. Y.

BIDS for electrical construction, day by day, all over the land carry the statement that "all work will be done in accordance with the Code," and that "only approved materials will be used." What does it mean? In every contractor's mind is a more or less vague understanding as to how electrical fittings and materials become classified as approved. But beyond the fact that Underwriters' Laboratories tests switches, panelboards, controllers and the like, and lists or labels them under a system of approval and identification, too little is generally known.

Nevertheless, certain yardsticks called the Electrical Standards of Underwriters' Laboratories, have been developed through the years. These standards are the requirements under which various electrical products are judged. So the method by which they are established and why and how they work become a matter of importance to the contractor.

For 43 years the Laboratories have been testing appliances but the development of the standards in their present form has come almost entirely since 1916. Ten years ago there were about 24 electrical standards. There are now 52 individual standards as shown in the accompanying list and it is likely that the number will increase to about 60 by the end of 1937. However, published requirements are not available for all the classifications of products included in Underwriters' Laboratories "List of Inspected Electrical Appliances." But the trend is toward more specifications for listed devices and materials, and it is quite likely that eventually there will be a standard for every class of electrical equipment handled by the Laboratories.

Each standard is a separate and complete set of requirements for a particular classification, covering the features which have a bearing on fire and accident hazards. To be considered acceptable, any device or material submitted to Underwriters' Laboratories, must be at least the equivalent of what is called for in the requirements. But a product may be considerably beyond the minimum requirements, both as to details of construction and test perform-

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ance. A device or material which has been passed by the Laboratories is considered to be well enough constructed, however, and capable of successful performance to the extent that fire and accident hazards incident to its use have been reduced to an acceptable degree.

As far as possible, every standard is, at the same time, a set of performance specifications. Test requirements are given wherever practicable and construction details are included, only when it is not feasible to conduct a test. For instance, in the case of service equipment it is entirely practicable to investigate a device by subjecting it to overload, endurance, heating, and dielectric strength tests, to determine that it will perform acceptably when installed in service. But it is not feasible to specify a test for the mechanical strength and rigidity of the enclosure. For this reason there are requirements for the minimum thickness of the metal employed and for the details of construction of seams, hinges, doors, etc.

The procedure that is followed in the development of these standards, is very orderly and precise, the product of a large experience. When a classification has reached the point where a standard is necessary or desirable, or when an existing standard is to be revised and reissued, a draft is prepared by the Laboratories and presented to the industry for review and comments. At the same time the proposed standard is submitted to the Laboatories' Electrical Council, which comprises 34 prominent inspection authorities throughout the United States and Canada.

Meanwhile, preliminary work on the new or revised standard, prior to its submittal to the industry and the Electrical Council, is generally handled by a small committee consisting of a few of the Laboratories' engineers and representatives of manufacturers of listed products in that particular branch of the electrical industry. These committees which are known as "Industry Conferences" are of great value in working up standards, for through this cooperation, much invaluable, first-hand information, based on actual manufacturing experience, is made available to the Laboratories.

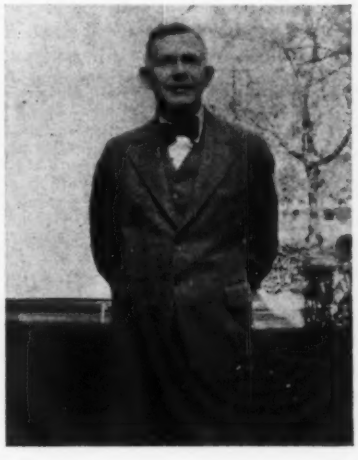
When a preliminary draft of a new or revised standard is released for review by the industry and the Electrical Council, all listed manufacturers in that classification and all the inspection authorities in question are invited to send in their comments and suggestions. These are always considered carefully by the Laboratories, sometimes made the subject of discussion at additional Industry Conference meetings, and frequently result in further changes in or additions to the requirements before the standard is published in final form.

Sometimes a long period is involved in the approach to a new standard. For example, twenty years ago there were no radio sets in general use. Fifteen years ago crystal sets were in the hands of the public but vacuum tube sets were relatively scarce. Ten years ago vacuum tube sets were common, but practically all battery operated. These sets were not listed by the Laboratories and it was not until about 1926 when A and B-battery eliminators were developed, that power-operated radio receiving appliances were submitted to the Laboratories.

(Continued on next page)

ELECTRICAL STANDARDS NOW IN FORCE—

Armored Cable and Cord
Attachment Plugs and Receptacles
Bells, Electric
Cabinets and Cutout Boxes
Christmas Tree Outfits
Conduit, Flexible Steel
Conduit, Rigid Steel
Cutout Bases
Fans, Motor-Operated
Fixtures
Fittings, for Hazardous Locations
Fixtures, Lighting for Hazardous Locations
Flatirons and Ironing Machines, Flexible Cord and Fixture Wire
Fuses, Cartridge Enclosed
Fuses, Plug
Gas Tube Sign and Oil Burner Ignition Cable
Heaters, Electric Car
Heating Appliances, Electric
Heating Pads, Electric
Industrial Control Equipment
Industrial Control Equipment for Hazardous Locations
Joints and Studs, Insulating
Lamp Holders, Edison Base
Lighting Plants, Electric
Motion Picture Cable and Stove Wire
Motors, for Use in Combustible Dust
Motors and Generators, for Hazardous Locations
Nonmetallic Sheathed Cable
Outlet Boxes
Panelboards
Raceways for Surface Wiring, Metal
Raceways, Metalic Underfloor
Raceways, Nonmetallic Underfloor
Radio Receiving Appliances, Power-Operated
Ranges, Domestic Electric
Refrigerating Systems, Commercial
Refrigerating Systems, Unit
Service Equipment
Signs, Electric
Soldering Lugs
Sound Recording and Reproducing Equipment
Switchboards, Dead Front
Switches, Enclosed
Switches, Knife
Switches, Snap
Therapeutic Carbon Arc Lamps
Transformers
Tubing, Flexible Nonmetallic
Wires and Cables, Rubber-Covered
Wires and Cables, Varnished Cloth
Wires, Slow-Burning and Slow-Burning Weatherproof



H. B. SMITH
in a Leisure Moment.

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[Continued from preceding page]

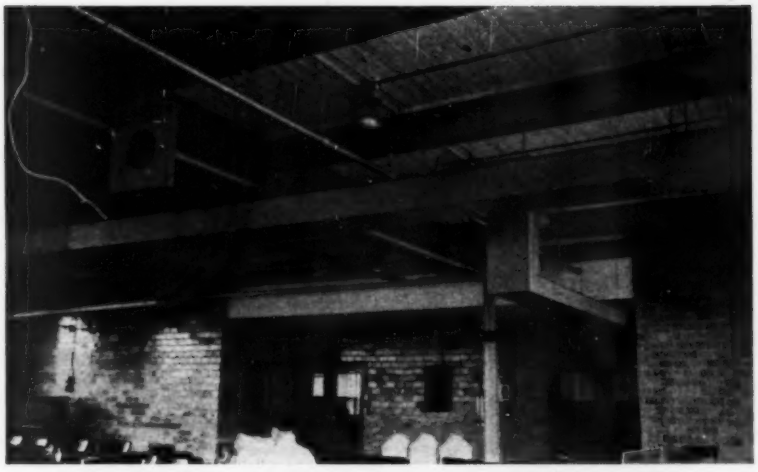
When the first power-operated radio receiving appliance was submitted to the Laboratories, it was judged on its merits with respect to the fire and accident hazards involved. As subsequent appliances were submitted, the Laboratories' increased experience with radio receivers made it possible to formulate some more or less definite requirements for the class. These requirements became well enough established so that, with the cooperation of the radio manufacturers, a standard was published in July, 1928. Many changes and new developments have occurred in radio during the past eight years and it has been necessary to revise and reissue that standard a number of times, the present January, 1935 issue being the fourth edition.

A Matter of Development

A standard is not necessarily published as soon as devices in a particular classification are listed. The establishment of requirements is a matter of development which takes longer in some cases than in others. Lamp-holders, for instance—sockets and receptacles—were listed for many years by the Laboratories before the first standard was published; but in the meantime these products were judged under tentative requirements which crystallized out of the Laboratories' experience with hundreds of devices submitted and investigated.

Outside of Underwriters' Laboratories, standards are used principally by the manufacturers whose products have been or will be submitted for examination and test. Each manufacturer naturally wishes to know as closely as possible just what requirements his device or material will have to meet. With definite specifications before him, many problems of design and production are simplified.

In a competitive line, the existence of a set of established requirements is of no little satisfaction to a manufacturer as it assures him that similar devices made by another manufacturer, if they are to be listed by the Laboratories, will have to be at least up to the standard in quality or merit. To the contractor, of course, the specification of approved materials and equipment establishes a minimum standard on competitive bids.



IN THE UPPER FOREGROUND *is a 36-ft. section of busway that contains an assembly of seventeen ¼-in. by 1-in. busses and a laminated ½-in. by 2-in. common bus for supplying the "life test" racks.*

A Busway System BUILT For Re-Use

Many Special Voltages Provided, All Isolated From the Other Wiring

TAP-OFFS FROM THE BUSWAY *run upward or downward to testing units in conduit. Each run terminates in a special plugging type junction box similar to this 8-pole unit.*

EVERY industrial plant has one or more manufacturing processes for which the electrical requirements are highly exacting. These requirements usually include continuity of current supply, maintenance of stable voltages, or the flexibility of the plant's wiring system. In the recently completed radio tube manufacturing plant of the Hygrade Sylvania Corporation at Salem, Mass., a system of permanent wiring was installed that does all this and more.

A choice of ten a.c. and d.c. voltages are distributed over this system, throughout the tube production and testing areas of an 80-ft. by 400-ft. two-story building. But despite the complicated and exacting

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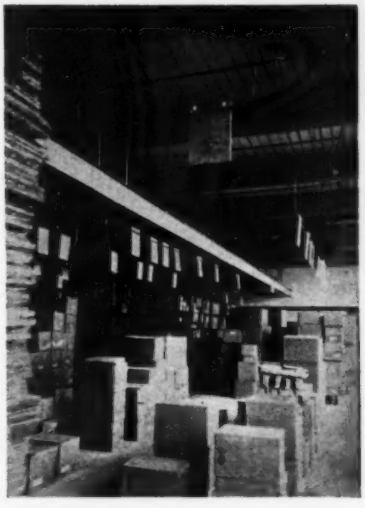
BEHIND THE SWITCHBOARD *are ten special motor-generators. Connections to main board and 18-bus assembly were routed through the floor from the ceiling below.*

They wanted a fool-proof test system and here it is.



BUSWAY RUNS WERE ROUTED *to utilize straight 10-ft. sections, suspended to clear other piping. There are ten ¼-in. by 1-in. copper busses and one common bus composed of two ¼-in. by 7-in. laminations. There are three 110-volt a. c. busses and seven busses for d.c. voltages up to 480.*

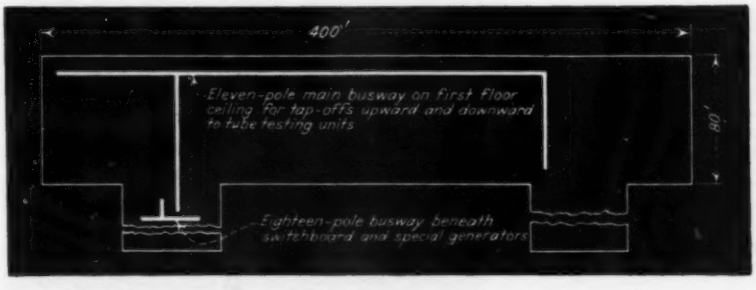
nature of the service required, it was all planned economically and with a view toward future plant expansion should a re-designed production layout be required.

A "Buswa" System was installed especially fabricated by the Trumbull Electric Mfg. Co., totalling almost 450 ft. in length. These busways were kept entirely independent of the general power and lighting system. In selecting this system, special consideration was given by Arthur P. Martin, chief electrician for the plant, to the following major requirements—

1—Adaptability to compact multi-voltage feeder distribution.
2—Voltage drop must not exceed one-fourth of one per cent at any point of the system.
3—Connections were required at accessible locations for making future changes in plant layout.
4—"Foolproof" separation of this system from general power and lighting system.
5—Adaptability to re-use under future revisions in plant layout.
6—Facilities for connecting up all production units quickly when moved in from another plant or section.
7—Suitability for installation in advance of the equipment, during a 90-day program of general plant wiring.

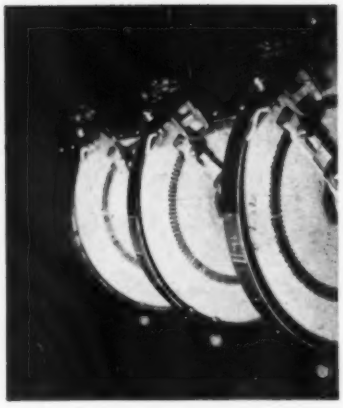
Estimates indicated a cost for this busway system of $12 per foot as compared to $13.50 per foot for rigid conduit and rubber covered conductors. Having been careful to design the busways to permit the use of straight 10-ft. sections with a minimum number of odd pieces at turns, the cost of specially constructed enclosures and busbar connections was thus held down. Likewise the electrical contractor, James Wilkinson & Company of Boston, Mass. averaged 75 ft. of straight busway per 8-hr. day with a three-man crew in erecting and completely assembling the job.

The completed system is an important part of the wiring in what is said to be the second largest plant in the world devoted exclusively to radio tube production. With the possibility of future plant enlargement and possible changes in production processes during the interim, it is claimed that this system represents an investment that is 98 per cent salvageable for many years to come.

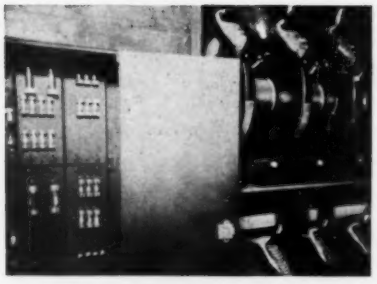

400'
Eleven-pole main busway on First Floor ceiling for tap-offs upward and downward to tube testing units
80'
Eighteen-pole busway beneath switchboard and special generators

STRAIGHT ROUTINGS *placed the busways near the present layout of production units. Off-sets and turns in the busses and enclosures were avoided.*

UMI



DIMMER CONTROLS *are simplified through the use of mercury tube tipping switches that open the motor and dimmer circuits when the dimmer arm reaches "full bright" or "black out" positions. An auxiliary mercury contact is used to automatically reverse the dimmer motor in a continuous cycling action. The motors and controlling relays operate at 6 volts through a transformer.*



THE REMOTE SWITCHBOARD *is combined with the motor-driven dimmer bank in a downstairs room. Here all contactors, relays, circuit and control fuses are kept under lock and key.*

A PORTABLE CONTROL PEDESTAL *connected with flexible cable may be placed near any member of the orchestra. Separate remote control levers are provided for the four color effects of each cove, also master controls for dimming, brightening or placing in motion any desired blend or combination of the four color groups. No dimmer levers are necessary. Dimmer motors do the work.*

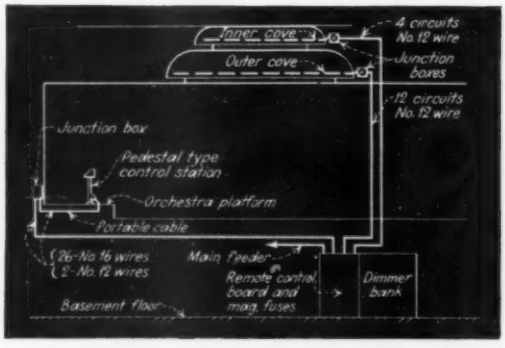
A Night Club Installs Color-in-Motion Through Light Mixed with Music

Color BY THE Orchestra

MANHATTAN is famous for its Greenwich Village, which is famous for its night clubs. And Jimmy Kelley's Night Club is now famous for its color-music. A system of selective mobile color lighting has just been installed there, operated by remote-controlled motorized dimming.

The ceiling was remodelled to create an elliptical dome at the center, cove-lighted in four colors with concealed reflectors and roundels. A portable pedestal type remote control station located on the orchestra platform provides a simplified means for setting up the color effects. As floor show or orchestra numbers change during the night, a flip of one or more switch levers changes the color combination, and sets up a new blending cycle, or stops one or more colors at any position that is desired.

A COMPACT WIRING *arrangement made this modernization job possible without requiring extensive alterations to conceal the remote control wiring.*



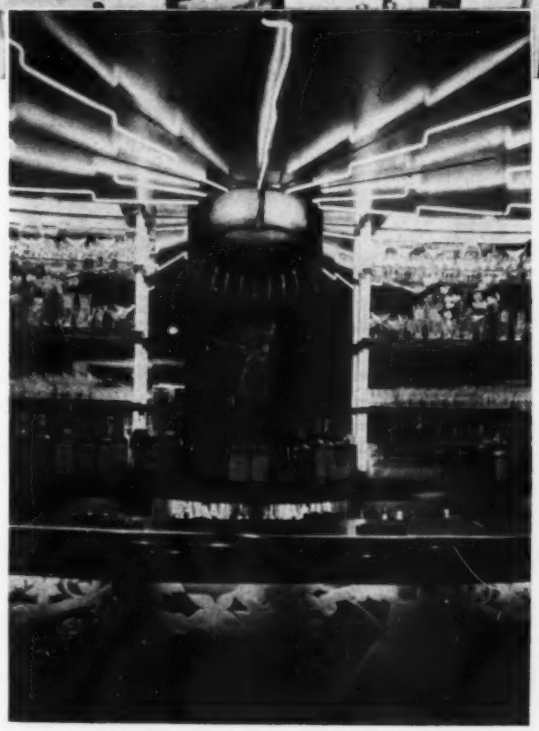
The dome-ceiling is lighted in four colors: Canary, red, blue and green. It is divided between an outer cove near the lower rim, and an inner cove that is recessed at a higher level within the dome's contour. The outer cove measures approximately 23 ft. by 16 ft., and is equipped with 135 100-watt Major Alzak reflectors, while the inner (upper) cove measures 9 ft. by 7 ft. and has 45 100-watt reflectors. Each reflector is equipped with natural colored heat resisting glass roundels.

For illuminating the acting area, directly beneath the dome, there are four 400-watt spots and one 1000-watt adjustable spot, concealed in two groups at opposite ends of the dome. The end housing for the 1000-watt spot, provides a concealed space for an attendant.

A "Motordim" control system, made by the Frank Adam Electric Company, was installed by The Village Electric Service, electrical contractors of New York. With this equipment, any or all of the four

color groups, in two coves, can be set up for continuous dimming cycles of 6 seconds duration. Any color pattern may be set up by means of tumbler switch levers on the control pedestal. Certain colors of either cove can at the same time be left in a fixed position or be remote-dimmed up or down, and left to operate at any desired point of intensity. One cove may be used to "paint" a pleasing pastel shade of fixed color, while the other cove is used for a mobile effect made up of one or more color groups.

Each of the eight color groups have two control levers on the orchestra pedestal. These levers are flipped for individually dimming one control to "black out" or "full-bright." These control levers may all be set to extend their control to master levers or to the continuous dimming feature, called the "Color-ama" control. Additional control features provide for sudden "black out," or for locking the control out of service. The pedestal control station may be operated in multiple with one or more control stations, if so desired.



BAR LIGHTING EFFECTS *are created with neon and lumiline that provide a gay tone to the decorative scheme. This blaze of reflected light is at the opposite end of the room from the orchestra platform.*

CEILING DOMES *provide diffused lighting in pleasing mobile color combinations over a 23-ft. by 58-ft. room area that seats about 200 guests.*

UMI

These Wiremen
Are Backed by $1,000 Worth
of Testing Equipment
Used for Selling – and It Pays

Free Inspection LANDS 484 Jobs

Superintendent H. D. BLAKENEY making a megger test in a Back Bay home, Boston

CLARK and Mills Electric Company of Boston has brought in $95,287 worth of business by free inspection of interior wiring. It has actually totalled 484 jobs.

H. D. Blakeney, superintendent, says that in virtually every instance the use of instruments has clinched the sale with the owner of the premises. Tests made on the spot demonstrate the condition of the wiring even to the layman and put teeth in the selling. Of course many other elements enter into the case. National and local advertising, credit conditions, cooperation of local utilities in financing installations on easy terms, reporting by meter readers of obsolete or dubious layouts, requirements of municipal inspection all have an influence. But with tests made guesswork is out.

Two Men Test

Clark & Mills have invested about $1,000 in testing instruments for this kind of service. This equipment supports a construction force working out of Boston and Cambridge offices and covers wide areas in eastern Massachusetts from Cape Cod through the North Shore and central state districts, as well as metropolitan Boston. The wiring tests are made by Mr. Blakeney or the assistant superintendent, A. G. Hanglin, either singly or with two persons making the measurements.

The instruments include two Weston indicating voltmeters (0 to 850 volts), an ohmmeter (0.1 to 1 megohm), two Biddle megohmmeters or "meggers" (one English and one German instrument with scale reading from 0 to 1,000 to infinity), one Weston milliammeter (0 to 500), and one General Electric indicating ammeter (reading with shunts from 1 to 200 amps.). This group of instruments has been used for about four years complete. The voltmeters and ammeters are calibrated every six months and the megohmmeters every three months, by the Boston Edison laboratory or the Cambridge Electric Light Company.

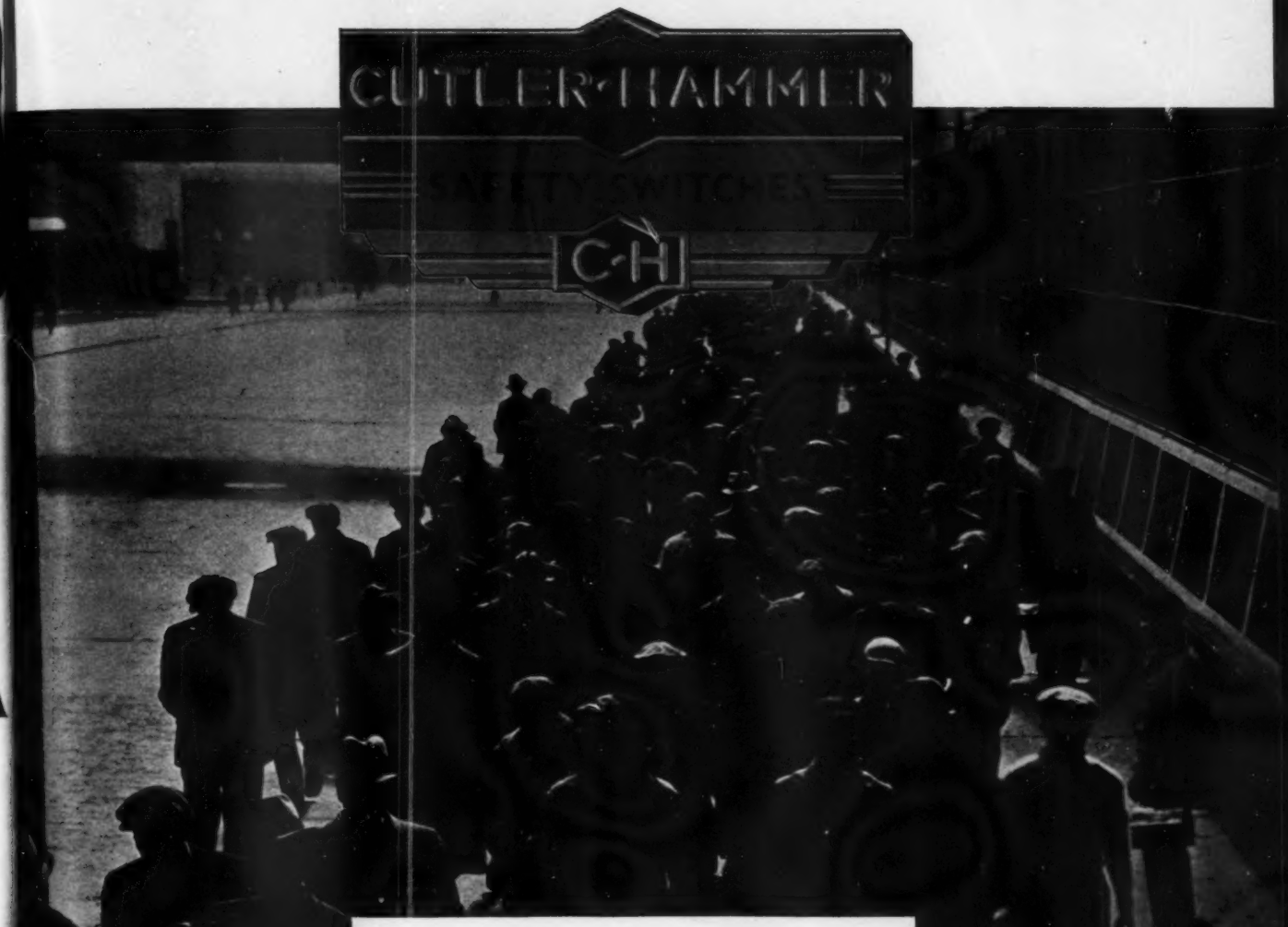
On the rare occasions where Clark & Mills desire to obtain voltmeter readings in chart form, one of the local utilities provides the instrument. These frequent calibrations are important not only in themselves but in putting Clark & Mills on a basis of testing where accurate comparisons can be made with independent engineering tests sometimes requested by the house owner.

Every wiring installation, whether new or old, is tested by megger for insulation between copper conductors, when isolated from each other and from copper to ground. Although the code approves an insulation resistance as low as 1 megohm, this company requires a minimum of 20 megohms to pass a wiring layout as satisfactory. Voltage drop tests are also made, the maximum permissible drop being 2 per cent from the service entrance to the most remote outlet. The ohmmeter provides the most satisfactory test for circuit grounds. No makeshift lamp hook-ups are used by Clark & Mills in testing for grounds. In the last five years the company has made thousands of ohmmeter tests on insulation of wiring. Overloading tests are made with an ammeter, checking the full load of the connected equipment against the allowed current per circuit.

Formal Reports

Under normal conditions wiring tests in a home can be made in from one to three hours, giving complete instrumental data. These are of course accompanied by comprehensive reports on the condition of wiring as observed in inspections, which include wiring devices, meter boards and panels, fuses, switches and every electrical hazard on main and branch circuits. In all this work emphasis is laid on improvements since 1923 in the manufacture of insulation, and the great advances in safety achieved in late years in wiring materials and their application.

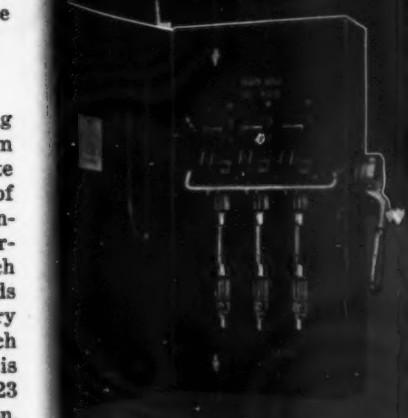
America is Back at Work!



Men have picked up their tools again. Pay envelopes are bigger. Money's flowing freely. The hungers and needs which America bottled up so long are now putting tremendous pressure on factory equipment—forcing Industry to rebuild, remodel, replenish—*almost over night.*

Industry needs new electrical equipment—vast amounts of it; equipment that will help turn out goods faster than ever before; equipment that is stronger, more durable, equal to unparalleled burdens. The contractor and wholesaler who furnish such equipment will prosper accordingly. Such contractors and wholesalers are turning to Cutler-Hammer for Safety Switches.

From 43 years of specialized contact with Industry, Cutler-Hammer has full knowledge of what Industry wants, and full knowledge how to produce it. C-H Safety Switches are built on that knowledge. CUTLER-HAMMER, Inc., *Pioneer Manufacturers of Electric Control Apparatus*, 1310 St. Paul Ave., Milwaukee, Wisconsin.



MED "CURRENT BREAKER"
ilt for 1937's tremendous responsibili-
—probably the "biggest package"
afety switch quality ever put out—
4101 type A Switch.

SMALL BUT RUGGED
The C-H Factory-Duty Bul. 4115 type A Safety Switch. Has every feature of the "Current Breaker" but mounts in extremely small space.

FOR ALL NEEDS
Explosion-proof, dust-tight, type C; type D—every switch you need is found in the Cutler-Hammer Line.

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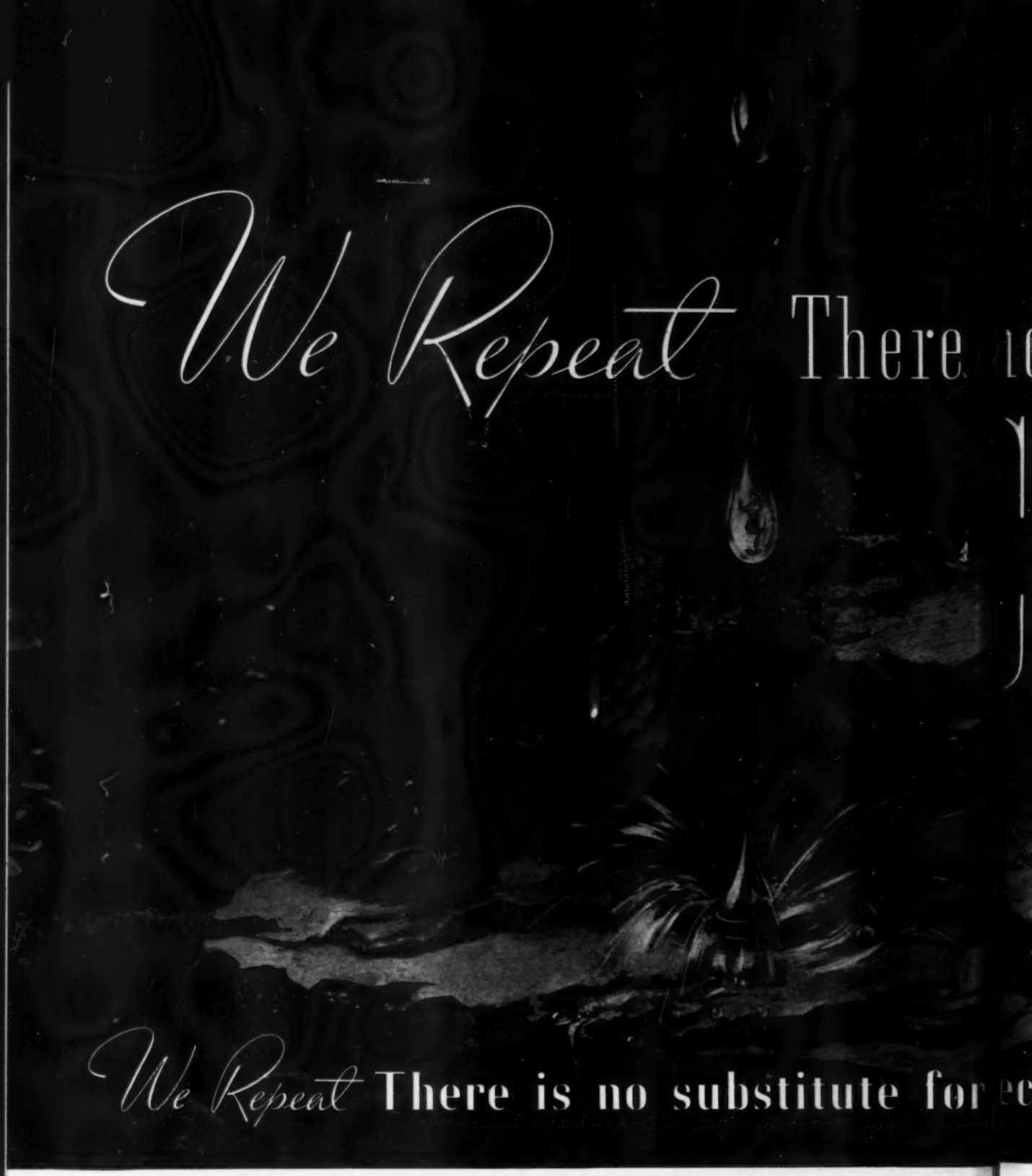

THE year 1936 was a banner year for Safecote. Month after month its advertising messages reached 162,000 readers who sell, use, or specify electrical conductors. Month after month their confidence in Safecote grew. Month after month the demand for Safecote grew because Safecote electrical conductors *combined* the three essential qualities: ***Flame Retarding—Moisture Resisting—Fishable.*** Month after month Safecote sales grew beyond all expectations. » » A new year lies before us. Safecote repeats its message of confidence. Safecote repeats its pledge, backed by eighteen leading wire manufacturers, to build Safecote electrical conductors to Safecote standards—***Flame Retarding; Moisture Resisting; Fishable, Slick Finish.*** There is no substitute for Safecote.

BUILT TED
BY T DIN

American pany
Anaconda Company
The M-L
Bishop eration
Clifton
Collyer pany
Crescent Cable
General
General

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to substitute for

Confidence

or ecote ★ ELECTRICAL CONDUCTORS

FLAME RETARDING MOISTURE RESISTING
SAFECOTE
FISHABLE — SLICK FINISH

U. S. LETTERS PATENT NUMBERS
1,635,829 1,772,436 1,765,000
1,798,486 1,410,790 1,536,549
OTHER PATENTS PENDING

INSIST UPON GENUINE SAFECOTE FOR YOUR PROTECTION

BUILT STED TO SAFECOTE STANDARDS BY TADING WIRE MANUFACTURERS

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General

Habirshaw Cable & Wire Corporation
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National Electric Products Corporation
Paranite Wire & Cable Company
Providence Insulated Wire Company
John A. Roebling's Sons Company
Simplex Wire & Cable Company
Triangle Conduit & Cable Co., Inc.
United States Rubber Products, Inc.

SAFECOTE LABORATORIES ARE AT YOUR DISPOSAL
SAFECOTE PERFORMANCE SPECIFICATIONS UPON REQUEST

GEORGE C. RICHARDS, LICENSOR'S AGENT
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HAZARD

RELIABILITY *and* CONFIDENCE

Firekrome SAFECOTE

BUILDING WIRE

combines the advantages of* SAFECOTE *Braid with* HAZARD'S *well known* 4 *grades of Insulation...

1. Hazacode, higher in quality than the usual run of "Code" wire. **2.** Intermediate, (25% rubber) tougher and more elastic. **3.** Standard, (30% or "Performance" insulation) high mechanical, chemical and electrical qualities. **4.** Performite, (super-aging insulation) more resistant to the effects of heat and moisture and age.

This combination of modern braid finish with an old well-known insulation makes a building wire that lasts as long as the building itself. Use Hazard Firekrome Safecote and forget your wiring problems.

Hazard Building Wire Book No. 125, containing interesting information, sent on request.

HAZARD INSULATED WIRE WORKS

Division of The Okonite Company, WORKS: WILKES-BARRE, PA.

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New York Chicago Philadelphia Pittsburgh Buffalo Boston
Atlanta Seattle Dallas San Francisco Los Angeles

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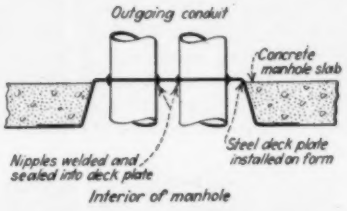
Methods of other CONTRACTORS

TOP-OF-MANHOLE DECKPLATE

In terminating feeder conduits vertically within manholes located out-of-doors, the problems of alignment and seepage protection were met in one operation. The use of raised steel deckplates and welded-in conduit nipples permitted the desired number of pipe entrances being cast in place when the concrete was poured.

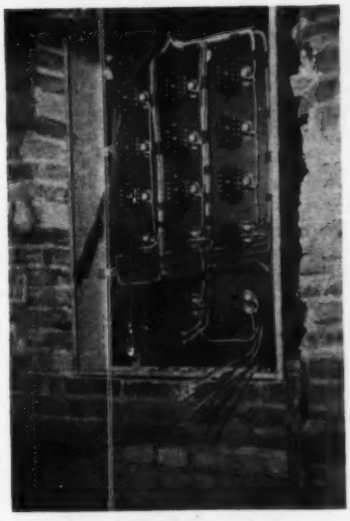
Exact Spacing — Conduits held secure and seepage-tight in concrete slab.

After the concrete had cured, the various runs of conduit could be connected up and extended as desired. The deckplate allowed all nipples being spaced to terminate in exact positions above pothead racks within manholes. The plates were hot-dipped galvanized to resist corrosion, after all nipples had been welded into place to form a leakproof plate. Spare capped nipples were provided to permit additional feeders being installed later. All threaded connections were sealed with a mixture of litharge powder and glycerine, followed with a coating of aluminum weather-resisting paint. This method was employed by the Edward J. White Company of Newark, N. J., in connection with an underground feeder installation for a paint factory.


Outgoing conduit
Concrete manhole slab
Steel deck plate installed on form
Nipples welded and sealed into deck plate
Interior of manhole

EASY-ACCESS MOUNTING

The connections to fourteen motor control stations and pilot lamps were made easily accessible by mounting these control devices on a steel plate within a cabinet that had doors on the rear and front sides. The cabinet was made 27 in. wide, 44 in. long and 8 in. deep and was set flush in an opening that was cut through an existing 8-in. brick wall. All conductors entered the top of the cabinet through a flush wireway that was provided within a chase. The wiring connections were easily routed and cabled in their proper positions adjacent the various control device terminals. Any future replacement of parts will be simplified, and will not necessitate any disturbance to the conductors. This work was done in connection with air conditioning a Lincoln, Neb., office building for which the wiring is being installed by the Dresback Electric Company.



Maintenance Aid — Cabinet set flush in wall with doors front and back.

BREAKERS ABOVE

In remodelling an industrial plant feeder switchboard, two new air circuit breakers were installed, each to serve as a main control and protective device for 550-volt feeders from two separate banks of power transformers. By installing 600-amp. 3-pole air circuit breakers above the main rear-of-board bus racks,

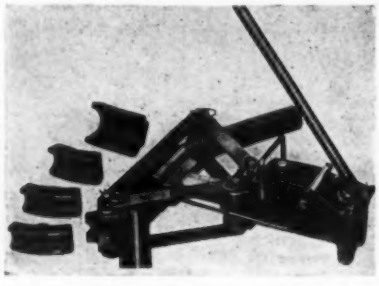
Space Problem—Solved by setting additional main breakers top of old board.

this rearrangement was effected without taking up additional space in a crowded plant. The breakers were provided with operating levers which are workable from the floor by means of inserting a long-handled disconnecting switch-hook. Ventilated sheet steel enclosures were provided for each unit which extend down to the steel side plates that enclose each end of the switchboard. Bus bar connections were made from the load side breaker terminals to the divided switchboard busses, while rubber-covered conductors from the trans-

UMI

GREENLEE
PROFIT MAKERS
For The Electrical Contractor

THE greater the efficiency of the tools you use, the more chance you have of meeting competition and making a profit on each job. That is why Greenlee Conduit Benders and Knockout Tools are so popular. They cut costs on every job and are liked by the men who use them.



Hydraulic Conduit Benders

Greenlee Hydraulic Conduit Benders insure profits, because they bend conduit quicker and easier than by other methods. In addition, they make smooth, even bends, eliminating many fittings and making it easy to pull in wire and cable. They are easy to take to the job, too, because they are readily portable.

Knockout Tools

Greenlee Knockout Punches and Cutters are time savers and profit makers, because they make it easy to enlarge holes in switch boxes, cabinets, etc. They form clean-cut holes quickly and accurately, without any reaming or filing.

Other Tools

Hydraulic Pipe Pushers
Joist Borers **Bit Extensions**
Electricians' Bits

Let us send complete information without obligation to you. Just use the convenient coupon.

GREENLEE TOOL CO.
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Please send complete information on the following:
☐ Conduit Benders
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My Jobber is.....1-37

formers were connected to the line side breaker terminals within deep compartments at the rear of the circuit breaker mounting panel. This installation by the Edward J. White Company, Newark, N. J., was made for a local paint factory in which a bank of three 333-kva. transformers was added to an existing bank of three 300-kva. transformers.

BACK TO BACK OUTLETS

Back-to-back or closely spaced outlets that occur on armored cable jobs are rarely nippled together, but are instead joined with short pieces of cable. Because the radius of the inner curved edge of armored cable bends shall not be less than five times the diameter of the cable, a generous length of cable must be used to avoid injury or pinched conductors in the bent area. If only short pieces are used the box connectors will not always make square

Good Looping—Ample bends in tight space with easy outlet box connections.

electrical contact with the outlet boxes without placing considerable strain on the looped cable. This photograph is from an installation by the Green Electric Company of Columbia, S.C., in a new building at the University of South Carolina. The camera was pointed downward toward convenience outlets that occurred almost back-to-back.

CABLE TO CONDUIT

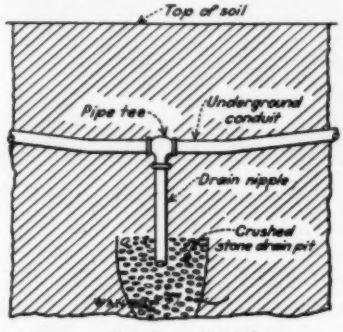
Armored cable run above metal lath ceilings was skinned of metal armor and pulled down, without splice or joint, through wall-chase conduit runs to various plug receptacle and switch outlets. Armored cable connectors and conduit couplings were used at the cable-to-conduit conversion point. This method eliminated the use of a junction box at that point, or the extension of conduit to the first ceiling outlet box, or the use of lead sheathed

Saves Box — Armoured cable, with armour skinned, run into conduit.

armored cable in walls that presumably were not sufficiently dry to permit the use of type AC cable for extending down in the chases. Installation by the Hunter Hogue Electric Company, Atlanta, Ga.

DRAINS FOR UNDERGROUND

Underground conduit runs between buildings, such as feeders from a garage service location to the distribution center in a residence, usually involve moisture pockets or traps because each end of the run consists of elbows that are stubbed upward to wall-mounted equipment. Drain outlets were provided to overcome this condition in connection with several outdoor runs of trapped conduit that were installed by Henry



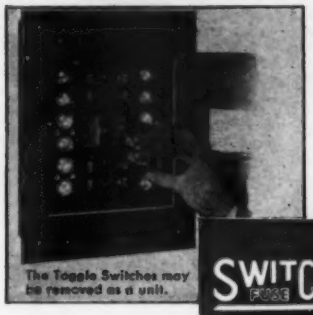
Water Proof — Buried runs trapped with nipple to drain pit.

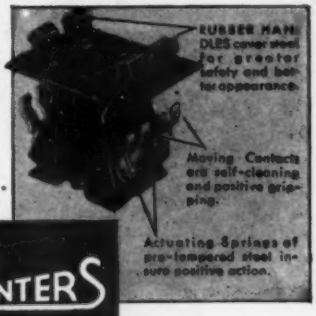
BULL DOG Plus FEATURES for 1937

MASTER TYPE Arc-Rupturing Chamber.
Partitioned Arc Chamber.
Main Moving Contact
Corrugated partitions prevent creepage and isolate the "LINE" and "LOAD" contacts.
Auxiliary Moving Contacts with arcing tips.

Vacu-Break SAFETY SWITCHES

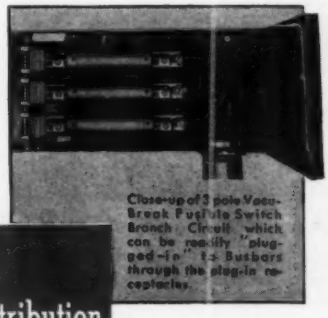
The basic principle of circuit rupturing of the new Bull Dog Vacu-Break Safety Switch gives a greater degree of safety against arcing and makes possible smaller and more compact cabinets without sacrifice of adequate wiring space. The modern Stylined cabinets give a distinctive outward appearance which reflects the finer inward quality. Vacu-Break Safety Switches are the safest switches ever designed.




RUBBER HANDLES cover steel for greater safety and better appearance.
Moving Contacts are self-cleaning and positive gripping.
Actuating Springs of pre-tempered steel insure positive action.

SWITCH FUSE CENTERS

The new improved Bull Dog Switch Centers are now available in a complete line. Fuse only type, Plug Fuse and Toggle Switch type, and Cartridge fuse and Toggle switch type . . . also the exclusive narrow column Switch Centers. Bull Dog Switch Centers have every type of installation range from residences and small stores to the largest commercial and industrial buildings. From 4 to 40 circuits, Main Lug, Main SaftoFuse and Main Fusible Switch.


Close-up of 3 pole Vacu-Break Portable Switch Branch Circuit which can be readily "plugged-in" to Busbars through the plug-in receptacles.

BUStribution

Bull Dog BUStribution systems—the flexible "plug-in" to Busbar method of electrical distribution. Handles all loads, combination of loads or changes of loads. A modern distribution system that is flexible and readily accessible to meet any changes in production conditions without the cost of additional wiring. Branch circuits are interchangeable for types as well as capacities. If any part of the system must be moved, salvage value is 100%.

Three phase fusible Trolley and section of Duct. View shows (1) Buss Bars along which (2) the Trolley Current Collector Wheels travel —(3) the Steel Carriage Wheel for movement and support of the Trolley—(4) Fuse Holder (5) Hanger for Supporting rod.

TROL-E-DUCT

Bull Dog Electro Trol-E-Duct is a system of portable electricity—it moves to or with the job, carrying the electricity where needed when needed. It consists essentially of Trolleys and standardized sectional units of steel Duct equipped with insulated Busbars, from which electrical current is collected by rollers on Trolleys and thence distributed to moving "loads" or portable electrical devices. Used in the world's leading industrial plants.

Specify BULL DOG to your Electrical Supplier

WRITE OR WIRE FOR ADDITIONAL INFORMATION AND PRICES

BULL DOG ELECTRIC PRODUCTS COMPANY

Manufacturers of Safety Switches, Fusenters, Light and Power Panel Boards, Switchboards, Duct Systems

DETROIT, MICHIGAN

BULL DOG ELECTRIC PRODUCTS OF CANADA, LTD. TORONTO, ONT.

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KILLARK
ST. LOUIS

Round Shoulders might be an advantage to a wrestler . . . . . .

TYPE XT

TYPE GRS

TYPE GEUE

TYPE GEMX

TYPE GECME

TYPE GSLB

TYPE FS with FSST Cover

TYPE T

TYPE NC with BLANK COVER

TYPE NLF

TYPE C with 5-Hole COMPOSITION COVER

BUT NOT IN FITTINGS . . .

You can't "pin down" a wrestler with round shoulders but you can make Killark "Flat Back" Electrolets fit snugly against the wall or ceiling.

The advantage in the shape of Killark Fittings is that they help to line up conduit after fittings are attached. Because conduit fittings must be hand installed and adjusted with all faces aligned, the "flat back" is an important factor for quick and efficient installation. They are made of unbreakable malleable iron in a complete range of sizes and styles. Listed as standard by Underwriters' Laboratories. Contractors everywhere are enthusiastic about Killark Electrolets.

KILLARK ELECTRIC COMPANY

3940 Easton Avenue St. Louis, Mo.

Hamann at a residence near Omaha, Nebr. Each run was laid with a uniform fall from both ends toward a central dry well or pit filled with crushed stone. Standard pipe tees and short drainage nipples that extended downward were inserted in each run at this point. The nipples were considered necessary to provide protection against surface drainage from causing sediment to clog the drain outlet.

COLUMN SUPPORTS

With two safety switches to mount on the face of a steel H-column, the feeder conduit and two branch conduits to install so as to dodge a roof truss above, the Terrell Electric Company of Chattanooga, Tenn., avoided making offsets in these conduits by using flat iron bolting bars at each point of support. The conduit and switch mountings required drilling only two holes for each bar in the heavy column, and these holes could be placed in the thinnest portions of the column flanges.

Offsets Avoided—Flat iron bolting bars simplify mounting safety switches.

■

It took a 3-man crew an average of 55 minutes per run to push 3-in. conduit under a 33-ft. concrete highway on a tough job that was recently done by the Union Electric Co. of New York. N. Y. There were a number of such cross-unders to install as a part of its contract, and Walter Latting says the investment in a new hydraulic pipe pusher more than paid for itself.

SIX REASONS WHY YOU SHOULD USE GENERAL ELECTRIC TAPES

FRICTION TAPES No. 360, 361, AND 371 — RUBBER TAPE No. 362

SELECTIVITY

A complete line of superior friction tapes and rubber tapes from which you can select those that meet your particular requirements.

PERMANENT ADHESION

G-E Friction Tapes will not dry up or ravel. They maintain their excellent adhesive qualities and stick tenaciously.

DEPENDABLE

G-E Tapes which you buy are the same as those used by General Electric.

MOLDABILITY

G-E Rubber Tapes can be molded by the heat of your hand into a watertight insulated joint.

ADDED VALUE

G-E High-quality Tapes cost no more than ordinary tapes.

EXTRA PROFITS

You can rely on G-E Tapes to do a perfect job that will help build your reputation as an outstanding contractor and ultimately increase your sales and profits.

For information on G-E Tapes, see your G-E Merchandise Distributor, or write Section M-881, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn.

GENERAL ELECTRIC

INSULATING MATERIALS

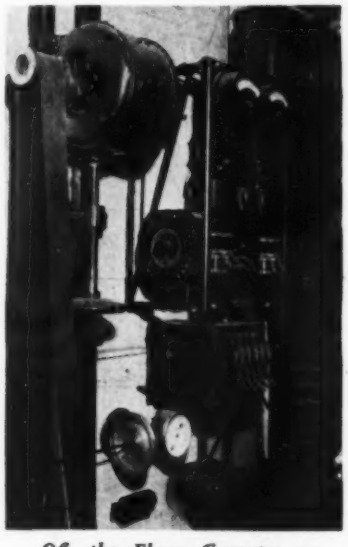
APPLIANCE AND MERCHANDISE DEPT.
GENERAL ELECTRIC COMPANY
BRIDGEPORT, CONNECTICUT

UMI

Among the MOTOR SHOPS

SPACE SAVING TEST OUTFIT

A wall mounted loading generator for conducting sustained load tests on repaired motors, which reduces the floor space required merely to the area of the motor being tested is in use at the Nager Electric Company, Inc., Brooklyn, N. Y. A 15-kw. generator is mounted upon 4-in. wide slotted channel iron slide rails that are secured to the shop wall. A heavy jackscrew and bearing bracket provide means for easily moving the generator up and down for a slot length of 12 in. to adjust belt tension between the pulleys on the loading generator and the motor that is bolted to the shop floor directly below. Because this vertical-drive arrangement takes so little space, it was set alongside the generator control panel and the main testing switchboard. An adjustable floor base for receiving the motor that is to be tested is also used for making locked-rotor and starting torque tests with a prony brake. Tachometer shafting and pulleys are also mounted on the rear wall for being belted to motors that are undergoing various tests.



Off the Floor—Generator on sliding wall base, operates right above motor being tested.

QUICK-SET SHEAR GUAGE

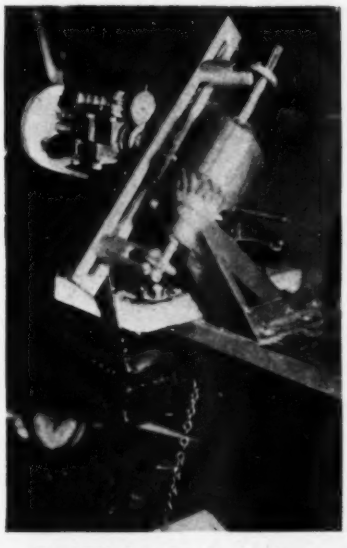
A set of sprockets and chain, an adjusting handwheel, an angle iron bar and two threaded posts which were added to a large shear have made it possible to set up quickly for cutting any desired width of strip insulation commonly used in motor winding. An adjustable bar of $\frac{3}{4}$-in. angle iron serves as a travelling stop or gauge for sheets of fish paper, fibre, etc., that are shoved under the shears. This bar is off-set to travel level with the table over a setting range of from $\frac{1}{2}$-in. to 10-in. The bar ends are secured to threaded collars which travel along over threaded sprocket-driven sleeves. These revolving sleeves are $1\frac{1}{8}$ in. diameter hollow steel with 8 threads per inch and they telescope heavy bolts that serve as supporting studs. As the gauge-adjusting hand wheel located on the front side of the shear is revolved, the sprocket and chain drive threads the adjustable stop-bar back and forth for the desired width of strips that are to be cut. Bright steel scales are set parallel with the threaded sleeves, and a pointer on the stop-bar indicates the exact width for which an adjustment has been made. The hand wheel is so geared that each revolution moves the bar $\frac{1}{4}$ in. This equipment was designed by J. W. Wilson of Macon, Ga.

Shear Control—Makes insulation cutting accurate without tedious measuring.

WINDS COILS OR ARMATURES

A bench-mounted assembly for winding small armatures by hand-crank rotation, or for winding coils of various shapes with a three-speed power drive has been built by the H. J. Electric Company, Inc., New York, N. Y., in which a slotted steel bar or head is used to attach coil forms as may be desired, or to attach shaft-holding yokes, when armatures are to be wound. Armatures up to 1 hp. and having shafts up to 1-in. diam. may be accommodated.

This winder is powered with a 1/5-hp. 1750 r.p.m. motor coupled to a speed reduction gear mechanism that was salvaged from a large sign flasher. It is equipped with a floor-treadle controlled resistor with which speeds may be varied by means of three grooved-pulley ratios and the resistor from 25 to 250 r.p.m. For shifting the v-belt or



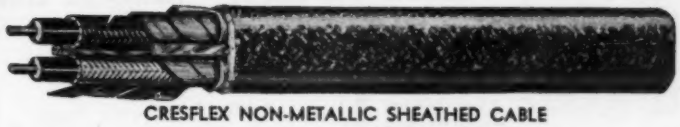
Dual-Winder—Works by hand or motor with floor treadle control, saves time and space.

UMI

VARNISHED CAMBRIC • RUBBER POWER CABLES • BUILDING WIRE • RADIO WIRES • SIGNAL CABLE • FLEXIBLE CORDS • LEAD-ENCASED AND PARKWAY CABLES • ARMORED CABLE

CRESFLEX NON-METALLIC SHEATHED CABLE • SERVICE ENTRANCE CABLE • MAGNET WIRE • BARE WIRE

ENTIRELY CRESCENT MADE



CRESFLEX NON-METALLIC SHEATHED CABLE

ARMORED BUSHED CABLE—TYPE A. C.

These splendid examples of **CRESCENT** manufacture were

RUBBER COVERED CABLE

EXTRA FLEXIBLE PORTABLE CABLE

MADE FROM START TO FINISH IN THE **CRESCENT** PLANT

The careful supervision given to the manufacture of Crescent Wire and Cable from raw material to finished product is only one reason why these products are of a uniformly high quality. Engineering skill of a high order has been devoted for many years to the improvement of the processes of production, with the result that the quality inherent in Crescent products is mutually advantageous to buyer and seller alike.

JOBBER COOPERATION – A PERMANENT POLICY

CRESCENT INSULATED WIRE & CABLE CO. INC

TRENTON, NEW JERSEY

CRESCENT ENDURITE SUPER-AGEING INSULATION • WEATHER PROOF WIRE

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SHAWMUT SHUR-LAG

RENEWABLE FUSES • RENEWAL LINKS

★ SHAWMUT SHUR-LAG Renewable Fuses provide greater time lag under unusual overload conditions; prevents unnecessary blowing.

★ No small parts to become lost or mislaid in refilling—simple and efficient in design.

★ Links are of uniform thickness—can be inserted from either end of the fuse case.

★ Can be assembled *only one way*—the correct way.

★ After blowing, fragments of link can be quickly, easily removed.

★ Und. Lab. Approved.

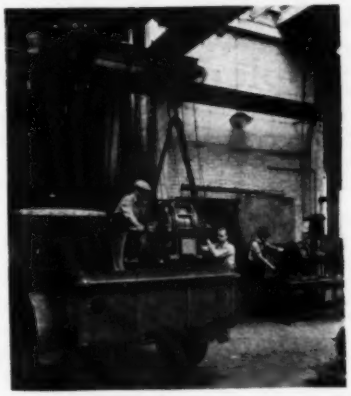
★ *Send for Shur-Lag folder, containing complete details, illustrations and prices.*

THE CHASE-SHAWMUT CO.
NEWBURYPORT, MASS.
FUSE SPECIALISTS SINCE 1893

for changing from power to hand rotation, the motor and gear box were mounted on a readily adjustable sliding base.

SPEEDY OVERHEAD WORK DISTRIBUTION

When trucks back in, at the Pacific Electric Motor Company, Oakland, Calif., a 10-ton travelling electric crane takes care of loading or unloading heavy equipment. There is no hazard to life, limb or machine breakage! Just a careful hitch with a proper size sling, and lots of heaving and tugging is eliminated. The movement of equipment, as well as regular production, is speeded up, because this crane "picks 'em up and sets 'em down" at just the right place without taking mechanics from their normal duties to lend a hand. Meanwhile, there is no need to clear



Safe Handling—This crane picks 'em up sets 'em down fast in an Oakland shop.

a busy aisle for the incoming or outgoing machine, because it coasts along overhead with 10-ton security against mishaps.

OIL SHIELDS AGAINST SPRAYED ENAMEL

If the spray gun operator gets quick-drying enamel or varnish upon the wearing surfaces of rotor shafts, armatures and the like, a time-saving safeguard is to apply a film of light oil before the spraying job is begun. The spill-over areas can be quickly wiped clean with a rag, because the film of oil prevents the sprayed material from becoming set or dry. Just keep an oil can on hand in the spray booth, squirt plenty of oil on the surface that is to be shielded, then wipe it around with the hands. The job is now ready for spraying.

UMI

Application . . . Installation . . . and MAINTENANCE

In Industrial, Commercial and Institutional Buildings

KEEP THE PLANT GOING!

Check Points for Winter

Old Man Winter usually brings a number of headaches to the man responsible for uninterrupted plant operation. Pipes freeze and burst; employees complain of draughts or get sick from stuffy, overheated rooms; cold snaps spoil or congeal mixes.

What to do about these things? In a recent jaunt around the country the editor noted a number of ways in which industrial maintenance men are beating Winter at his own game. Some of these smart ideas follow—

Warm Air for Workman

The Mack Truck Co., Long Island City, N. Y., installed 40 unit heaters to replace pipe coils and radiators. The steam lines were rearranged for "zone control" of the heating, which permits the engineer to regulate temperatures in all departments. Results: fuel costs were reduced 40 per cent; production in the paint shop was increased by having a uniform temperature; valve and trap maintenance is negligible.

In another plant rotating type of unit heaters were installed. Each unit has two outlets, which are opposite each other and make one revolution every two minutes. In very cold weather adjustable louvres can be set to direct warm air to the workers.

Hard to Heat Places

To eliminate drafts in a receiving department one plant installed a thermostatically controlled unit heater over the platform. This heater directs a blast of warm air toward the outside doors whenever they are opened.

If an employee must work in the corner of a building which is difficult to heat with the main heating system, he can be made comfortable with an electric space heater. This type of heater is used in cashier's booths, isolated offices, gate houses and crane cabs.

Lights Turned on Automatically

In winter the problem of the right amount of light becomes important. If control is manual, lights are either not turned on soon enough, or, having been switched on during a temporary "gloom," they are kept burning when daylight has come back.

Westinghouse has provided for *automatic* control of illumination in its East Pittsburgh plant. When the light intensity is reduced to four foot-candles because of clouds or setting of the sun, the ten 1,000 watt overhead lighting units are turned on by the "electric eye;" this same device turns off the lights when the light intensity is again increased to twelve foot-candles (See illustration).

Over a period of one year the automatically controlled group showed a saving of 14,976 kw.hr. or

Photo-electric control turns lights on and off to conform with daylight conditions in this large manufacturing aisle at the Westinghouse East Pittsburgh plant. The 1,000 watt overhead lighting units require no attention from the workmen—the human factor in regulating illumination has been eliminated.

UMI

WHERE CAN YOU USE SMALL ELECTRIC HEATING UNITS?

Application	Specific Use	Type of Heater
ASSEMBLY	Soldering	Electric soldering irons plugged into bench sockets
	Melting, Gluing	Small electrically heated pots
MAINTENANCE and REPAIRING	Baking coils and armatures; dehydrating refrigerator parts	Small electric ovens
HEAT TREATING	Heat treating small parts; laboratory applications	Bench-type electric furnaces
SAFETY	Heating inflammable compounds; water seal of gas wells	Immersion heaters
DRYING	Drying material on conveyors	Heating elements mounted in reflecting hoods
	Drying rooms, special enclosures	Strip heaters
CURING	Heating and molding rubber and plastics	Strip or cartridge heaters
PLATING, OIL-DRAWING	Heating electrolytic and drawing baths	Immersion heaters
PREVENTION of CONGEALING and FREEZING	Soap and oil in pipes; water in pumps and at dry valves	Heating cable, wrapped or formed to contour
IMPROVING WORKING CONDITIONS	Local space heating; gate-house, operator's cab, factory office, corners of unheated buildings	Unit electric air heaters
	Heating large areas; general interior work area, garages, loading and receiving platforms, isolated departments	Electric unit heaters with motor-driven fans
GENERATING PROCESS STEAM	Vaporizing gasoline for singeing; local requirements	Electric steam generators

1,497.6 kw.hr. per lamp less than that recorded for the manually operated lights.

The equipment operates with unfailing accuracy, requires no attention from the workmen, and pays for itself with the power that is saved.

Electrically Heated Pipes

Heating cable wound on pipes prevents congealing of material, such as soap, oil and chemicals. The cable is wrapped around the pipe at one or more places and should be covered with insulating material for permanent installation and operating economy.

In this connection, another problem is the pump and dry valve on the sprinkler system. Heating cable can be formed to the contour of these units and placed directly on them, protecting them from freezing.

Industrial heating cable has a lead sheath and an overall diameter of about ¼-inch. The generally recommended length is 60 ft. for operation on 115 volts, (rating is 400 watts), and 120 ft. for use on 230 volts (rating of 800 watts). Thermostatic control maintains even temperatures.

Ventilation

Dust and fume removal is especially pertinent during these months when cold weather might interfere with the plant's ventilating system. One of the very latest installations is in the new plant of the Hamilton Standard Propellers Division of United Aircraft Corporation, East Hartford, Conn. A dust-collecting unit is part of each workman's bench in the grinding and polishing department.

The dust is conveyed to a cyclone collector on the roof. Air exhausts to atmosphere, and the dust settles to containers. Exhausted air from the department is replaced with fresh air blown through a "compensating unit" which heats it for that department in winter.

MORE "ELBOW ROOM"

A superintendent was informed that he could have a machine for a certain department, but that it had to be placed next to the shaper and not extend into the aisle along the wall.

What did he do about it? A gear motor, with the exact speed reduction, was mounted on the back of the machine, eliminating the pulley drive which extended into the aisle.

UMI

Dispatcher gives the order.

Loud speaker at one end of floor.

Floor man need not leave his work.

Communication System Speeds Operations in this Warehouse

A novel communication system has been installed in a cooperatively run grocery warehouse.

The merchandise is collected by men in all parts of the building, put on an extensive conveyor system, and sent to the shipping department where the orders are consolidated for member's trucks.

The dispatcher, in order to correct errors and make changes, had to have a means of communicating with the men on the several floors. Previously a bell and a speaking-tube system were used. However, this meant that when the bell rang the worker would often have to walk from the extreme end of his floor to the central speaking tube.

A microphone loud-speaker system was installed to enable the dispatcher to give verbal instructions. Above the microphone are knobs which make connections with the desired floor. Two loudspeakers, one of which is shown in the illustration on the right, reproduce the dispatcher's words on each floor. The dispatcher does not need to signal by bell. He merely calls the name of a particular worker and gives instructions—just as if he were talking to him in person. Interruptions are thus eliminated for both the dispatcher and worker.

If necessary, the worker can reply by using the speaking-tube system which was not dismantled.

DID YOU EVER HAVE TO FLOODLIGHT A BUILDING?

So the "Front Office" wants to floodlight the building? Here are some things to consider:

Location of equipment — On a nearby building, poles, ground—if possible, hidden by shrubbery.

Type of equipment—Open type which consists of a lamp socket in a reflector of porcelain enameled steel; enclosed type has a lamp socket mounted in a metal housing, usually provided with a silvered glass reflector, and covered with a clear, stippled or colored glass.

Number of floodlights — Determine area to be covered, relative position of floodlights, and refer to distribution data tables supplied by manufacturers of the lighting equipment.

Required intensity in foot-candles—Obtained from tables in handbook on illumination.

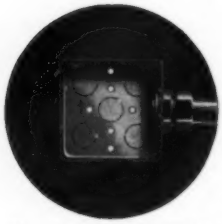
Size of floodlights—Determined by dividing the total area to be lighted by the number of floodlights necessary for the area.

Los Angeles Times Building Illuminated with Novalux Floodlighting Projectors.

UMI

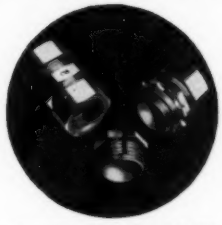
ELECTRUNITE Steeltubes

REG. U. S. PAT. OFF.



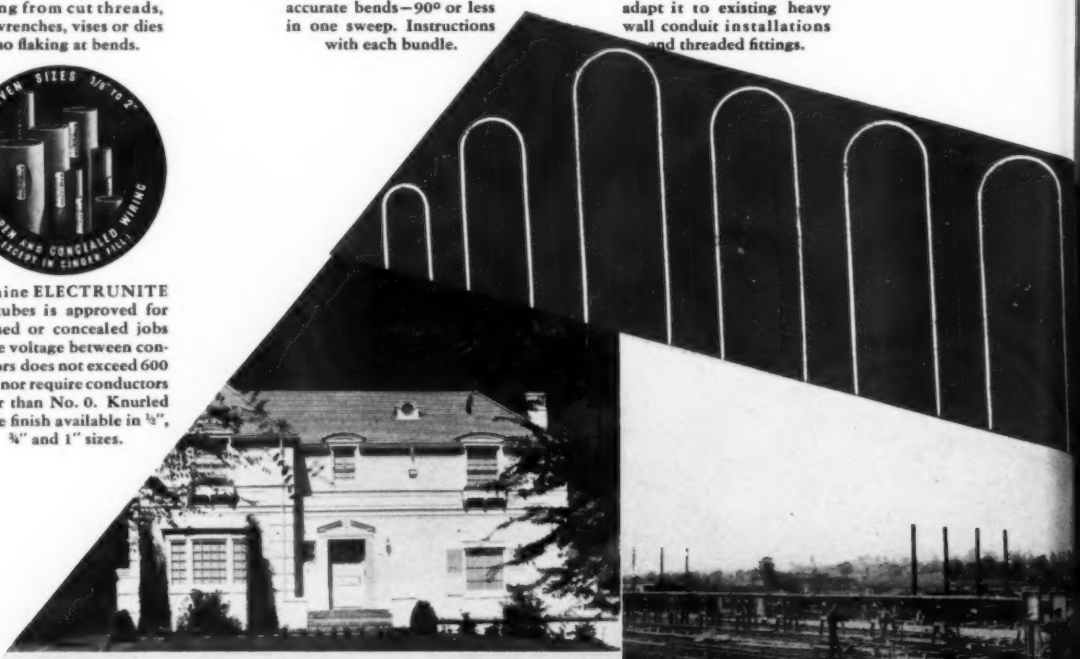
Genuine ELECTRUNITE Steeltubes affords positive, *uniform* protection against rust and corrosion at every point. No damage to zinc coating from cut threads, pipe wrenches, vises or dies—no flaking at bends.

Genuine ELECTRUNITE Steeltubes bends easily and perfectly. It may be straightened and rebent just as easily. A simple roll-type tool makes accurate bends—90° or less in one sweep. Instructions with each bundle.



Genuine ELECTRUNITE Steeltubes is threadless—requires only three simple fittings to make positive, safe, water-tight joints—and adapt it to existing heavy wall conduit installations and threaded fittings.

Genuine ELECTRUNITE Steeltubes is approved for exposed or concealed jobs where voltage between conductors does not exceed 600 volts nor require conductors larger than No. 0. Knurled inside finish available in ½", ¾" and 1" sizes.



★ *Above:* 17,000 feet of ELECTRUNITE Steeltubes was installed in Scott Building, one of three buildings at Toledo (Ohio) University in which a total of 50,000 feet was used.

★ *At Top:* All wiring in this all-electric residence of Mr. H. C. Chapman in Westwood, California, is protected by ELECTRUNITE Steeltubes—the safe, economical raceway.

★ *Above:* An interesting installation of ELECTRUNITE Steeltubes in poured concrete pan type construction on new $1,500,000 Mount Pleasant Senior High School, Providence, Rhode Island.

Patent No. 1,962,876

ELECTRICALLY • WELDED •

MARCHES ON . . .

• More than 1,000,000 feet—more than 50,000,000 feet—now, more than 125,000,000 feet—thus, in a few short years ELECTRUNITE Steeltubes, the pioneer modern raceway for wiring, has moved to the head of the parade and marches on.

Upon its introduction, ELECTRUNITE Steeltubes was a radically new type of conduit—many electrical contractors were skeptical. Now, those same contractors are praising it—using it as their standard in figuring bids—and profiting from its advantages. As knowledge of its possibilities became more widespread, more architects are specifying ELECTRUNITE Steeltubes—public utilities and industrial concerns are adopting it.

Genuine ELECTRUNITE Steeltubes has received popular recognition and approval entirely through the many advantages it affords. It is light in weight—easy to handle and install. It requires less wall and floor space. It is threadless. It cuts and bends with remarkable ease. Its patented knurled inside surface makes wire pulling approximately 30% easier. It is highly resistant to corrosion at every point. With all necessary fittings, it actually costs less than threaded conduit. And it affords adequate electrical and mechanical protection for wiring—has received wide approval for most every type of installation, even buried in concrete.

Progressive contractors are stepping along at the head of the business parade in their localities—with genuine ELECTRUNITE Steeltubes. They are obtaining more contracts—at more profitable figures. It's not too early to make a resolution for 1937—that you, too, will take advantage of the business possibilities afforded by ELECTRUNITE Steeltubes and march on to better profits. Ask your electrical wholesaler to give you figures—or write us for full information. Remember—*genuine* ELECTRUNITE Steeltubes—the original Electrical Metallic Tubing manufactured only by Steel and Tubes, Inc.—costs no more than imitation brands.

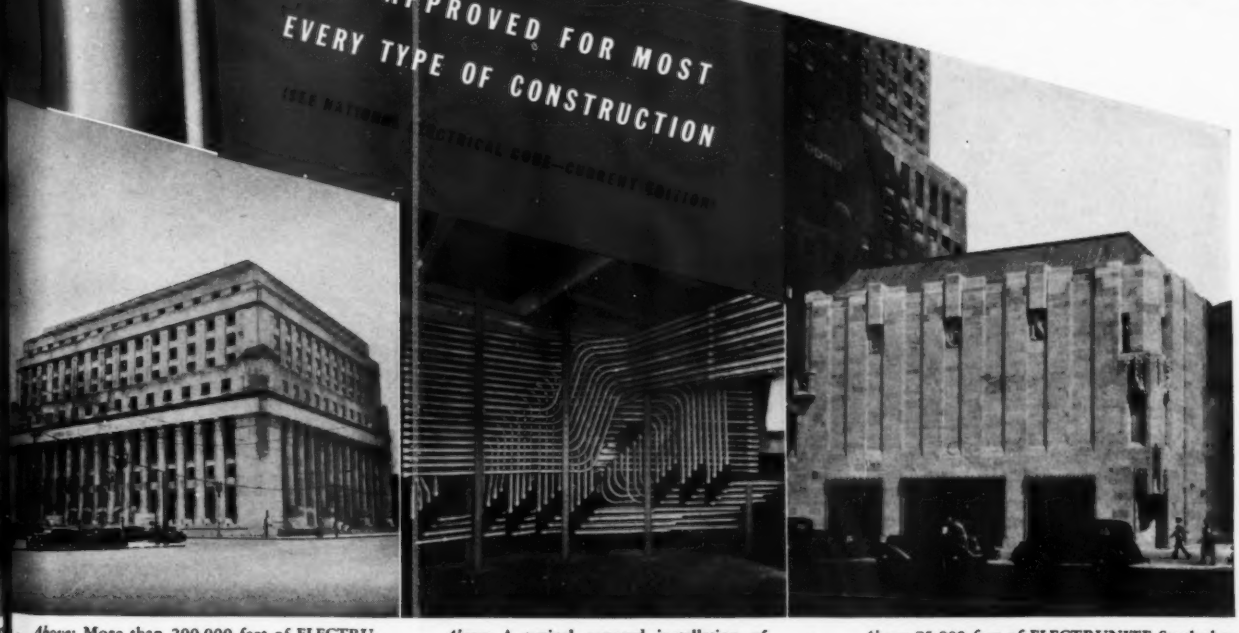
SUBSIDIARY OF REPUBLIC STEEL CORPORATION

Electrical Division

Steel and Tubes *Inc.*

WORLD'S LARGEST PRODUCER OF ELECTRICALLY WELDED TUBING

CLEVELAND . . . OHIO



★ *Above:* More than 200,000 feet of ELECTRUNITE Steeltubes was installed in the $4,500,000 U. S. Custom House and Court House Building at St. Louis, Missouri.

★ *Above:* A typical exposed installation of ELECTRUNITE Steeltubes made by one of the country's leading utility companies. A total of 50,000 feet of 2" tubing was used.

★ *Above:* 75,000 feet of ELECTRUNITE Steeltubes was used in wiring the building and installing the equipment at WGN—nationally famous Chicago Tribune Radio Station, Chicago, Illinois.

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K&H

SOLDERLESS TERMINAL LUGS AND CONNECTORS

A complete line of quality lugs and connectors, for every application. Write for new catalog illustrating in color the entire K & H line.

Cat. No. 4007

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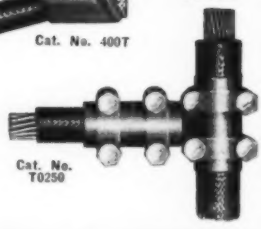

Cat. No. T0250

KRUEGER & HUDEPOHL

232-8 Vine Street, Cincinnati, Ohio

MARTINDALE SLOT INSULATION FOLDER

A remarkable time saver! Quickly folds slot linings from $\frac{1}{8}$" up in width and up to 11" in length.

Uniform linings speed up armature winding. Three precision wheels permit quick adjustment.

Price—$65.00 net, f. o. b. Cleveland, O. Net weight 79 lbs. Shipping weight 110 lbs.

MARTINDALE ELECTRIC CO.

1352 Hird Ave. Cleveland, Ohio

Gentlemen: Please send us

☐ **One Slot Insulation Folder**

☐ **Descriptive Literature.**

_____ (Company)

_____ (Street Address)

_____ (City) (State)

By _____ (Name and Title)

STATOR STRIPPING THREE WAYS

Your Method?—It's done several ways with definite advantages.

When motors burn out the old windings must be removed and in most cases completely replaced. Often stator windings are stripped before the motor is sent to the motor rewinding shop. This is done at the plant, to make sure the old windings are not going to be patched up, or to provide work for the plant maintenance force.

The labor cost of rewinding a.c. motors is influenced to no little extent by the time that is required to strip off the old windings and the time required to prepare the slots for the installation of new coils. In general, there are three conventional methods commonly employed for stripping: (1) Burning off the old insulation by means of a gas flame or by building a fire within and around the stator, (2) burning off the old insulation by subjecting the stator windings to a breakdown current, and (3) removing the coils "cold," by mechanical means, without resorting to any burning-off process. Some shop operators avoid methods No. 1 and No. 2, being fearful of overheating the stator shell, with the possibility of cracking or buckling it out of shape.

One of the largest operators in New England, however, claims that the "roasting" process for consuming the old insulation of defective windings is a most efficient method. This is a modification of method No. 1.

After the coil ends have been cut away, initial heat is applied with a large ring-jet gas burner. The burner is adjusted to generate combustion of the stator insulation, after which the insulation is left to smolder and gradually become consumed. This method limits the attainment of high temperatures, yet the insulation is reduced to a powder-like state. The coils are thus easily lifted out with a screw driver or small pinch bar, after which the cells can easily be cleaned of surface varnish.

The use of method No. 2 (with breakdown current) has a disadvantage in that the windings cannot be cut away until after the insulation is burned off, in order to have the connected phase groups available for energizing them. Moreover, a stator having opened or shorted, coils cannot be energized uniformly, and only a partial burning job will therefore result.

Method No. 3 has one principal advantage, namely, the avoidance of unpleasant smoke and odors that usually result from burning old insulation. Hand winches and air or electrically operated hoists are employed to operate "grab" hooks for removing coils from "cold" stators, with the stator firmly anchored at a convenient position.

Because of the number of "bites" required in "cold" coil stripping, the actual time consumed equals that required under the burning-off methods. Certain extremely tight coils won't budge without the application of torch heat alongside the slot area. Rough handling of tight coils often results in loosening or springing the end laminations.

Cutting away an old set of coils may be done most effectively and with the least possible damage to the end laminations of the stator before the insulation has been consumed. Air gun cutting tools have been adapted to this operation with marked success. For making a square cut-off, especially in small stators, it is necessary to employ a chisel tool having an offset shank.

An easy and good way to cut out stator coils.

When the old windings are left intact in order to burn them off electrically, as in method No. 2, the subsequent cutting operation obviously becomes more difficult than when the insulated coil mass is reasonably firm. The loose wires of burned-off coils are not as easily cut off because they tend to bend under the chisel blow. The cutting tool often engages the stator iron and can quickly become dulled in the hands of an inexperienced mechanic. This results in slowed up stripping. Careless use of the chisel also adds to the cost of cleaning and smoothing the slot laminations.

UMI

MY MAINTENANCE JOB

EDITOR, Maintenance Section

Dear Sir:

"My Maintenance Job" was the subject up for discussion at a recent bi-weekly luncheon meeting where ideas on shop operations are regularly exchanged. The suggestions presented and methods now in practice were varied and interesting because of the different industries represented. Some things on which there was general agreement are listed below:

Modernization does not necessarily mean large capital expenditures. Much can be done to insure adequate production capacity and prevent unnecessary shutdowns by checking auxiliaries. Can modern drives be installed? Can speed control be improved? Has protective equipment been put on the machines? Is suitable control provided?

Lighting equipment should be cleaned regularly and blackened lamps replaced. Measurement of illumination at regular intervals is advantageous; foot-candle readings can be used as a basis for cleaning schedules.

Daylight is also a financial consideration. Charges for it include cost of windows over a blank wall, glass breakage, window-cleaning, and mistakes and inaccuracies which might be avoided by careful control of artificial illumination.

How is the inside weather? Do employees seem fatigued about four o'clock? Probably the heating and ventilating can be regulated. Where air conditioning has been installed for plant processes, great improvement in employee health has usually resulted.

Flexible electrical distribution will be economical where production equipment is frequently rearranged. Machines can be equipped with individual motor drives, proper control equipment, illumination, and long flexible cords for plugging in at conveniently placed power outlets.

Portable equipment can be moved to the work instead of moving the work to the equipment. Many companies have found that in some processes greater efficiency can be obtained.

Materials handling always holds attention. Small parts can be put in tote-boxes and, like larger parts, sent to the next operation on a conveyor. Consolidated lots can be transported from one department to another by electric trucks. Monorail hoists can be used advantageously.—R.M.S.

GO GET HIM··

HE NEEDS YOU AND AN OHIO CARBON BRUSH

You Mr. Electrician, can cool this fellow down—cool the motor and heat the house, all at the same time and by the same method—Ohio Carbon Brushes.

Carry a stock of these dependable brushes with their quality ingredients, long life and uniformity You will get many emergency calls, which in most cases can be remedied by an Ohio Carbon Brush. This profitable business is well worth going after because it leads to more and bigger repair jobs.

Satisfy yourself by satisfying your customers—stock Ohio Carbon Brushes.

THE OHIO CARBON CO.

12508 BEREA ROAD · CLEVELAND, OHIO

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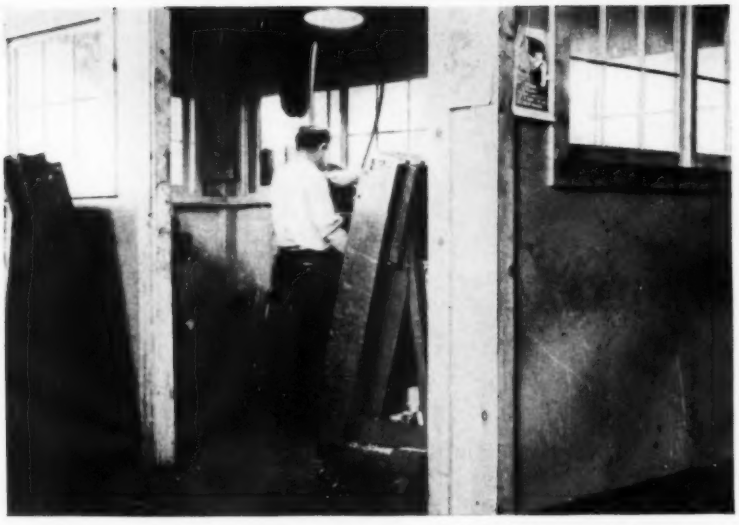


Enclosed space for boring operation eliminates dust, shadows and air current.

A "Plant Within a Plant"

A Cleveland firm which had added a special boring machine to its production line found that it was not producing accurate holes in pistons for automobile motors.

Investigation disclosed three causes — (1) the machine, tools and work accumulated metallic dust from turning and grinding operations in the immediate vicinity, making both the setting of the pistons in the fixtures and the gaging of the bored holes uncertain; (2) poor lighting caused confusing shadows and prevented accurate gaging; (3) fluctuating temperatures due to air currents in the plant caused unequal expansion in the work and dies, resulting in rejections for off-size work which gaged correctly when bored.

A "plant within a plant" was the solution. At the place where the boring operation was required, a special room was constructed of wood frame, beaver board, and glass sash. The enclosed space was made sufficiently large for the boring and for storing several truckloads of material so that they would be at the same temperature as the room for the machining operation. The single opening to the enclosure was made just large enough to admit trucks. The interior walls and ceiling were painted with light-reflecting material, and a light was suspended above the gaging point on the machine to give even, glareless illumination.

The small investment for the enclosure brought good returns. Dust and shadows were eliminated, and variations in gage readings caused by temperature changes disappeared.

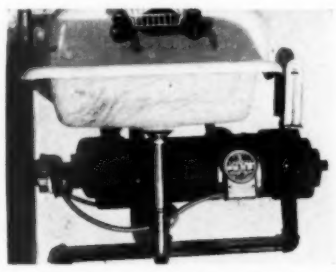
Air-conditioning of the room has been thought of but has not been considered necessary, however, that further refinement is contemplated if greater accuracy should be needed.

ELECTRIC WATER HEATER FOR WASHROOM

How shall we get hot water to the washroom? Here is how one company in Buffalo, N. Y., took care of its requirement.

The water heater was made from a piece of six inch pipe, with the necessary couplings and plugs at each end. An immersion-type heater, rated 1,000 watts, was inserted at one end and an indicating thermometer at the opposite end. A surface-type aquastat was attached to control the temperature.

This equipment furnished all the hot water required, at a temperature of 120 degrees Fahrenheit.



Electric heater furnishes all the hot water.

How About It?

Questions and Answers

Q. *What compound can be used for fastening pigtails in carbon brushes?*

A. One method that has been used for securing pigtails in carbon brushes does not make use of any compound except soft solder. At the top of the brush near one edge drill a hole of the proper size for the pigtail to slip into and in that edge drill another hole so that the two holes are at right angles to each other; in other words, form an "L" within the brush. After turning the end of the pigtail insert it in the proper place, then turn the brush on edge and pour some solder into the hole in that edge. The solder anchors the pigtail in place. Avoid using a surplus of solder because it will run up the pigtail and stiffen it.

Another method for fastening the pigtails requires the drilling of two holes so that their bottoms cross. Insert the pigtail in one hole and tamp firmly other small pieces of pigtail wire into the other hole. If carefully done the pigtail shunt wire will be solidly anchored.

Q. *When testing for grounds on a three-wire a.c. 110/220 volt light panel with a test lamp a spark is obtained when the busbars are touched, but the lamp does not light nor will a voltmeter give any reading. Does this spark indicate a ground with a high-tension wire, or other abnormal condition, or, if not that, what is the cause?*

A. Sparks are probably due to condenser action and not a high-tension ground, as is indicated by the fact that a reading is not obtained on the voltmeter. The condenser action is probably because a considerable part, perhaps all, of the wiring is in conduit or other metal covering. The wire which carries the current and is insulated from the conduit becomes, in effect, one plate of a condenser, the conduit forms the other plate because it takes on a charge opposite in sign to that of the wire. Although the alternating current tends to limit the amount of the charge, at any instant there is enough to cause a small spark.

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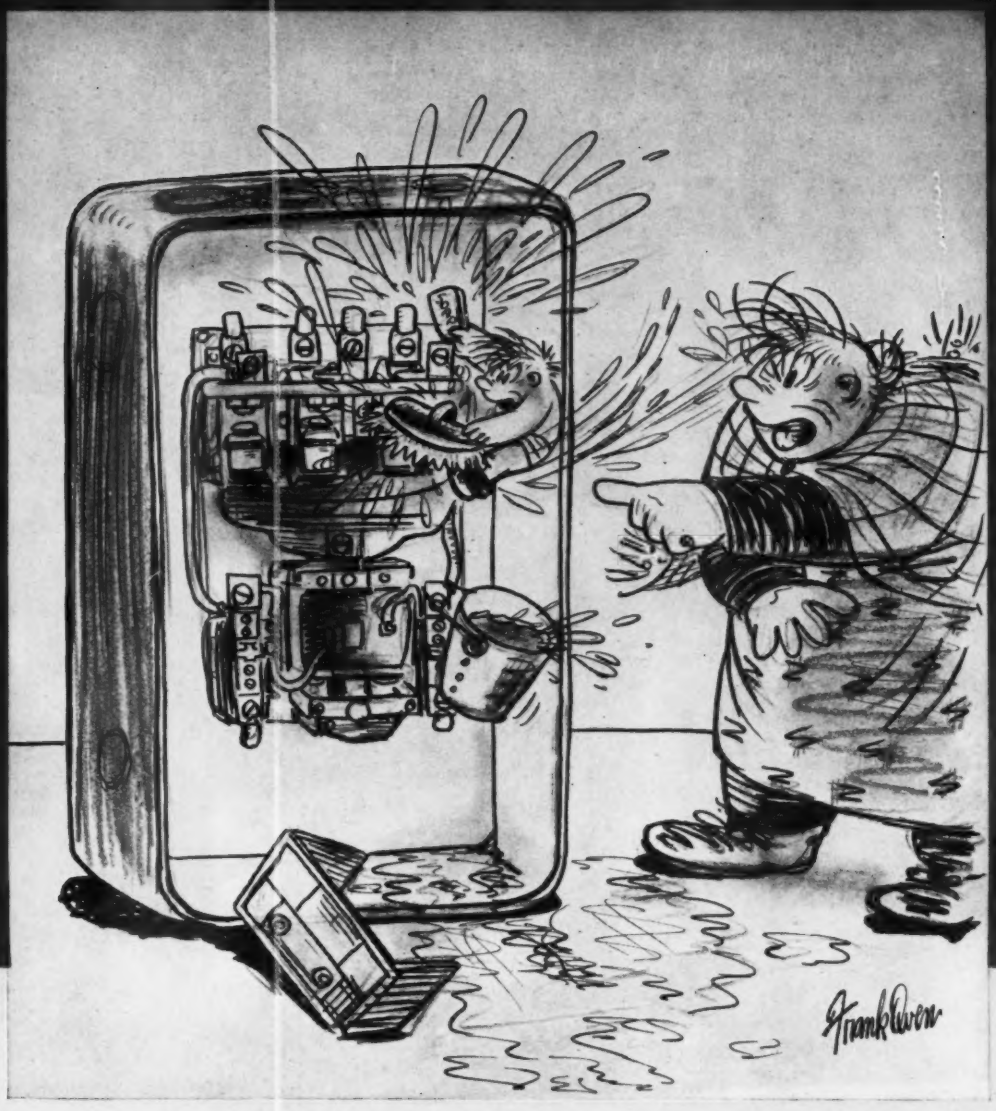
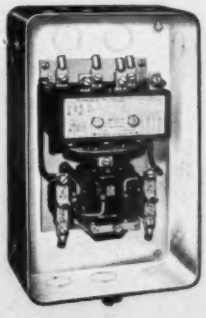


"No, no, Philbert—those contacts never need any cleaning!"



Bulletin 709 solenoid starter with cover removed

Don't make Philbert's mistake—the contacts of the Bulletin 709 never require cleaning or dressing

Neither Philbert's scrubbing brush nor a maintenance man's file and sandpaper should ever be used on the contacts of the Bulletin 709 solenoid starter. Oxides that may form on these silver alloy contacts do not interfere with satisfactory operation, whereas oxides on copper contacts are serious troublemakers and must be filed away. Filing of silver alloy contacts is not only unnecessary but harmful, for it wastes contact life. Bulletin 709 starters can be safely neglected.

ALLEN-BRADLEY SOLENOID CONTROL

UMI

ALLEN-BRADLEY BULLETIN 709

MAINTENANCE-FREE SOLENOID STARTERS

Here is a line of automatic starters that have truly set the pace in modern motor control. The simplicity of the solenoid mechanism appeals instantly to all users of automatic control. No clapper type starter can approach the Bulletin 709 solenoid starter for dependable and maintenance-free service.

ENCLOSED ARC

A molded hood smothers the arc, tremendously increasing the current disrupting capacity and preventing flashovers.

NO CONTACT FILING

The double break, patented silver alloy contacts never need cleaning, filing, or "dressing."

FEWER PARTS

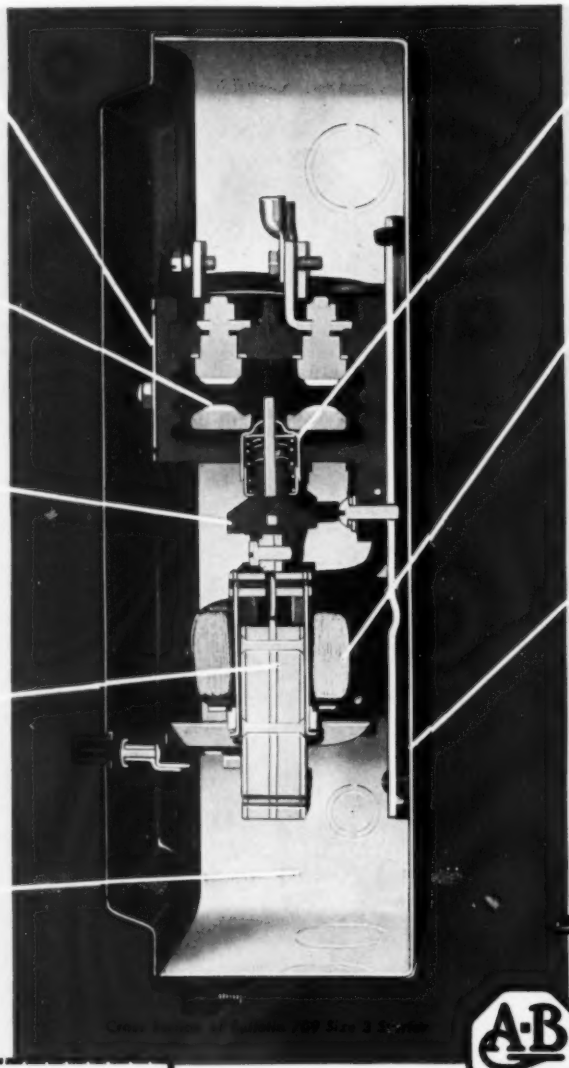
The solenoid has fewer moving and wearing parts than clapper contactors. There are no flexible jumpers to break.

NO BEARINGS

The solenoid has no bearings. The plunger travels in its guide channels without friction.

EASY TO INSTALL

Terminals are accessible. Cabinets have white enameled interiors. There is ample wiring space.



NO CONTACT REBOUND

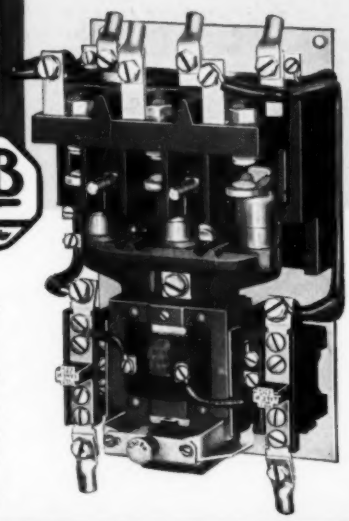
The straight up and down motion of the solenoid prevents contact rebound—the principle cause of contact welding.

LOW DROP-OUT VOLTAGE

The low drop-out voltage of the solenoid mechanism prevents unnecessary shutdowns when line voltage conditions are bad.

UNIT CONSTRUCTION

The switch is assembled on a metal base plate which can be mounted to metal without extra insulation. Hence, it is easily assembled into special panels.



Bulletin 709 solenoid starter with arc hood removed.

Maximum Polyphase Ratings

Size 1— 5 hp, 220 v; 7½ hp, 440-550 v
Size 2—15 hp, 220 v; 25 hp, 440-550 v
Size 3—30 hp, 220 v; 50 hp, 440-550 v

Write for complete information.

Free BOOKLET

Allen-Bradley Co.,
1327 S. First St.
Milwaukee, Wis.

Please send me your new FREE booklet "The Story of the Solenoid Starter."

Name.....

Company.....

Street.....

City.....State.....

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For Better LIGHTING JOBS

Design Chart for Theatre Lighting

This illumination design data chart provides an approximate but simple means of planning the illumination for new theatres or for checking lighting conditions in existing houses. For easiest use, the chart has values assigned to four groups of theatres based on seating capacity.

This is, of course, not always the best method of grouping, but where a smaller theatre is in a more than average competitive district, values for the next larger size theatre may be used. For each size of theatre and each area of the theatre, recommended footcandle requirements are given, 50-100 f.c. for the underside of a marquee of a 1200-2500 seat house, 2 f.c. for the foyer of a 300-700 seat house, etc.

Using these footcandle values, and average conditions for this size of house, average room size and ceiling height, color of light and reflection factors of walls and ceiling, watts per sq.ft. value based on five different lighting systems have been calculated. For example, to provide 10 f.c. in the lobby of a 700-1200 seat house with fixtures using small exposed lamps, 3 to 5 watts per sq.ft. would be required. If the lobby were 20 by 30 ft., or 600 sq.ft. in size, 1800-3000 watts would therefore be necessary. No figures are given for the picture lighting in the auditorium because color is so variable.

In this same study, note 2 provides a useful rule for calculating poster lighting. Posters require 10 times the illumination of the surroundings, required watts per sq.ft. equal

ILLUMINATION DESIGN DATA CHART FOR THEATRES

Size of Theatre		Under Marquee	Lobby	Foyer	Rest Rooms	Lavatories	Passage Ways	Spaces near Auditorium	Auditorium: Intermission	Auditorium: During Pictures
2500 or MORE Seats	**Recommended Footcandles**	100 up	20	5	10	15	3	1	3	0.1–0.2
	REQUIRED WATTS PER SQUARE FOOT — Small Exposed Lamps	40–50	8–11	4–6	5–7	4–5	0.5–1	1–1.5	1–1.5	Varies
	Luminous Elements	40–50	7–9	3–5	4–6	3–5	0.6–1	1–1.5	0.5–1	
	Indirect Lighting	50–60	13–17	7–10	7–10	5–7	1–2	2–3	1–2	
	Semi-Indirect	35–35	7–9	4–6	4–6	2–4	0.6–1	1–1.5	0.5–1	
	Direct	25–35	6–8	3–4	3–5	3–5	0.5–1	0.5–1	1–2	
1200 to 2500	**Recommended Footcandles**	50–100	15	5	5	10	2	1	2	0.15–0.1
	REQUIRED WATTS PER SQUARE FOOT — Small Exposed Lamps	20–40	5–7	4–5	5–7	3–5	0 3–0.5	1–2	1–1.5	Varies
	Luminous Elements	20–40	5–7	3–4	3–5	3–5	0.4–0.6	1–1.5	0.5–1	
	Indirect Lighting	25–50	10–15	6–8	5–8	3–5	0.5–1.0	2–3	1–2	
	Semi-Indirect	15–30	3–5	3–5	4–6	2–3	0.4–0.6	1–1.5	0.5–1	
	Direct	12–25	3–4	3–4	3–5	3–4	0.3–0.5	0.5–1	1–1.5	
700 to 1200	**Recommended Footcandles**	30–50	10	3	5	10	1	0.5	1	0.05–0.1
	REQUIRED WATTS PER SQUARE FOOT — Small Exposed Lamps	12–20	3–5	2–4	3–5	3–4	0.2–0.4	0.5–1	0.5–1	Varies
	Luminous Elements	12–20	4–6	2–3	3–4	3–4	0.2–0.4	0.5–1	0.3–0.5	
	Indirect Lighting	15–30	6–8	4–8	4–6	3–5	0.4–0.8	1–1.5	1–2	
	Semi-Indirect	10–17	3–4	2–4	3–4	2–3	0.2–0.3	0.5–1	0.3–0.5	
	Direct	10–15	2–3	2–3	2–3	2–3	0.2–0.3	0.3–0.5	0.5–1	
300 to 700	**Recommended Footcandles**	30	10	2	3	10	1	0.5	1	0.03–.05
	REQUIRED WATTS PER SQUARE FOOT — Small Exposed Lamps	10–15	3–5	2–3	2–3	3–4	0.2–0.3	0.5–1	0.5–1	Varies
	Luminous Elements	10–15	3–5	1–2	2–3	3–4	0.2–0.3	0.5–1	0.3–0.5	
	Indirect Lighting	15–20	6–8	5–7	3–4	3–5	0.4–0.8	1–2	1–2	
	Semi-Indirect	9–14	3–4	2–3	2–3	2–3	0.1–0.3	0.5–1	0.3–0.5	
	Direct	8–11	2–3	1–2	1–2	2–3	0.2–0.3	0.3–0.5	0.5–1	

Above Data Based on Typical Room Sizes and Following Average Specifications

LAMP EFFICIENCY FACTORS — Small exposed lamps 60%, Lum. Elements 70%, Indirect 75%, Semi-Indirect & Direct 100%

Lamp Output Due to Color		100%		80%		40%		60%		100%		100%		30%		80%		1 to 80%	
REFLECTION FACTORS OF CEILING (C) and SIDEWALLS (S)	Size (Seats)	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S	C	S
	2500 or more	.70	.10	.50	.50	.50	.50	.50	.50	.70	.50	.70	.50	.50	.50	.70	.50	.70	.50
	1200–2500	.70	.10	.50	.50	.50	.30	.50	.30	.70	.50	.70	.50	.50	.30	.50	.50	.50	.50
	700–1200	.70	.10	.50	.30	.50	.30	.50	.30	.70	.50	.50	.50	.50	.30	.50	.30	.50	.30
	300–700	.70	.10	.50	.50	.50	.30	.50	.30	.80	.50	.50	.30	.30	.30	.30	.30	.30	.30

Note (1) Other auditorium color circuits require approximately the same watts per foot values as for intermissions unless a separate directive lighting system is provided. (2) For advertising effectiveness, posters require approximately ten times the illumination of the surroundings. Required watts per foot — 4 x footcandle value of surroundings. Nela Park Engineering Dept., of G. E. Co.

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DID YOU READ ABOUT CONSOLIDATED ?.. JUST FIRED A NEW 14-POT FURNACE.
NO WONDER! MORE PEOPLE ARE USING THE CONSOLIDATED ENGINEERING AND DESIGN SERVICE.

● It's true! Discriminating buyers of illuminating glassware all over the country are bringing their problems to our Engineering and Design Service. This department of our business, under the direction of a competent designing engineer, is equipped to solve the problems confronting glass buyers daily. It is a supplementary service which enables Consolidated to offer specially designed lighting units as well as the diversified standard line.

● Proof of the acceptance of this complete illuminating glassware service is found in such comments from the trade as we have quoted above. This service is one reason for such indications of better business as the firing of our new 14-pot furnace in November. Join the throng of glass buyers who have found the answer to their glass problems at Consolidated. May we talk with you? No obligation, of course.

The complete line of standard illuminating glassware manufactured by Consolidated also merits your attention. The new, colorfully illustrated catalog should be in your files for ready reference. Send for your copy.

CONSOLIDATED
Quality
GLASSWARE

CONSOLIDATED
LAMP AND GLASS COMPANY
CORAOPOLIS, PENNSYLVANIA

two times f.c. values of the surroundings. In the lobby of a 300-700 seat house, with 10 f.c. for example, the poster should have 10 times this value, or, 100 f.c., and to produce this four times the illumination value of the lobby is required, or 40 watts per sq.ft.

What Happens When Lamps Are Placed on Circuit

by L. R. Keiffer
GENERAL ELECTRIC COMPANY
Nela Park Engineering Department
Cleveland, Ohio

It is often necessary to know the initial inrush of current when 115-volt incandescent lamps are connected into a circuit. The accompanying table gives an easy method of determining these values.

Lamp Wattage	Ratio Hot to Cold Resistance	Current			Time in Seconds for Current to Decrease to	
		Normal	Ratio Initial Max. to Normal	Initial Max.	Twice Normal Value	Normal Value
		Amp.		Amp.	Sec.	Sec.
75.....	14.8	.652	12	7.8	0.01	0.07
100.....	14.9	.870	11	9.5	0.02	0.10
200.....	15.1	1.74	10	17.4	0.03	0.10
300.....	15.2	2.62	10	26.2	0.03	0.13
500.....	15.3	4.35	9	39.3	0.03	0.15
750.....	15.3	6.52	8	52.2	0.04	0.17
1000....	15.6	8.70	7	60.9	0.07	0.23

There seems to be a misconception in certain cases that vacuum lamps do not have the high initial inrush of current that is characteristic of gas-filled lamps. There are several reasons why this inrush of current may possibly be more noticeable with gas-filled lamps.

In the first place, the ratio of hot to cold resistance is not as great with vacuum lamps, due to the fact that the filament does not operate at as high a temperature. Vacuum lamps usually have a ratio of hot to cold resistance of approximately 13 to 1, as compared with approximately 15 or 16 to 1 for gas-filled lamps.

The ratio of hot to cold resistance for gas-filled lamps increases with the wattage rating on lamps of a given voltage class due to the fact that the efficiency and therefore operating temperature also increases with wattage. The maximum current may vary considerably, depending on the circuit impedance and other factors.

How the current changes during this transient period, may be learned by comparing the column showing the ratio of initial maximum to normal current with the time required for the current to decrease to two times normal value, and to normal value. For instance, the current of a 100-watt lamp shows a maximum current approximately eleven times the final constant value. This current decreases to twice its final constant value in 0.02 seconds. Another 0.08 seconds is required for the current to decrease from double current to the final value.

Approximately 0.10 seconds overall is required for the current to reach a final constant value. In general, the time required for the current to reach a final constant value is approximately 4 to 5 times the time required for the current to decrease to two times the final constant value.

The over-shooting of current in the usual types of switches should not be a serious factor because the current decreases to normal so rapidly that initial heating is negligible. The trouble that is encountered with regular types of snap or flush switches has been due more to the increased lighting load which these switches have been called upon to carry than to any over-shooting of the current.

In practically all cases it is found that considerably more arcing occurs when the circuit is broken. This "break" of a circuit, in general, is much harder on the switch than the "make". At the time of the "break"

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TODAY, MORE IMPORTANT THAN EVER

THE RLM LABEL

New, higher RLM Standards are your assurance of even greater efficiency and increased quality in RLM DOME REFLECTORS.

Important, as are these new higher standards, they simply make stronger than ever the reasons for insisting upon Reflectors with the RLM Label, when specifying or purchasing industrial lighting equipment. Basically the RLM Label stands for these essentials of efficient lighting:

1 BALANCED LIGHTING FOR INDUSTRY.
The quantity of light output delivered by a reflector does not alone determine its efficiency. It is equally important that this light be evenly distributed and diffused. There is no economy in securing maximum light output at the expense of well diffused lighting which contributes so important a part in the workman's efficiency.

2 QUALITY PORCELAIN ENAMELED REFLECTING SURFACE.
Balanced Industrial Lighting is best produced through the medium of a porcelain enameled reflecting surface. In addition to providing the ideal reflecting surface, porcelain enamel is the most durable of reflecting materials. Result: Lower maintenance and replacement costs.

3 WARRANTY OF UNIFORMITY.
The RLM Label is the buyer's assurance that every reflector so labeled meets the RLM standard specifications and is of uniform quality. A rigid inspection and testing system conducted by an independent testing laboratory insures constant conformance to RLM Standards by members of the Institute.

For further information about RLM Reflectors, you are invited to communicate with any of the members of the RLM STANDARDS INSTITUTE, *Incorporated.*

ABOLITE REFLECTOR COMPANY
West Lafayette, Ohio

BENJAMIN ELECTRIC MFG. CO.
Des Plaines, Illinois

GOODRICH ELECTRIC COMPANY
Chicago, Illinois

THE MILLER COMPANY
Meriden, Connecticut

OVERBAGH AND AYRES MFG. CO.
Chicago, Illinois

QUADRANGLE MFG. COMPANY
Chicago, Illinois

WESTINGHOUSE ELECTRIC AND MFG. COMPANY
Cleveland, Ohio

WHEELER REFLECTOR CO.
Boston, Massachusetts

RLM STANDARDS INSTITUTE
INCORPORATED

THE CERTIFICATE OF RLM UNIFORM QUALITY

ATTENTION
ELECTRICAL CONTRACTORS

This is one advertisement in a campaign of education sponsored by the RLM Standards Institute and directed to the industrial users of lighting reflectors.

It is reproduced here so that you may see the work being done in your behalf and to suggest to you the wisdom of insisting upon the RLM Label whenever you supply or specify reflectors. Show the buyer that he gets MORE for his money from an installation of RLM Dome Reflectors—you'll make a better sale, a lasting customer, and a better profit.

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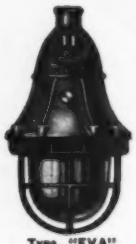
EXPLOSION PROTECTION

with

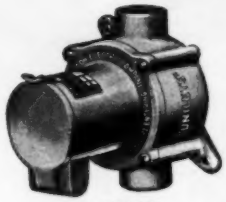
APPLETON

Explosion-Proof Unilets

MDS Series Explosion-Proof Unilets



Type "EVA" Explosion-Proof Lighting Fixture (100 and 200-Watt)



Type "CPSIC" Unilet Complete with Lift Cover (Closed)

Type "GRUSE" Unilet

Type "EFSC" Motor Control Push Button Station

Type "CEST" Explosion-Proof Receptacle Equipment Complete with Type "CPH" Plug

Explosion protection is assured with Appleton Explosion-Proof Unilets. In any location where explosion gas or dust is present, Appleton Explosion-Proof Unilets protect lives and property by removing one cause of detonation. Their use also results in lower insurance rates.

Made of malleable iron, their sturdiness gives thorough protection, and the Cadmium finish resists rust.

Write today for Bulletin 1003.

Sold Through Wholesalers

APPLETON ELECTRIC COMPANY
1704 Wellington Ave., Chicago, U. S. A.

New York.....76 Ninth Avenue Detroit....7621 Woodward Avenue
San Francisco..635 Minna Street St. Louis.....420 Frisco Building
Los Angeles.....340 Azusa Street Atlanta...540 Marietta St. N. W.

APPLETON

Explosion-Proof

UNILETS

Reg. U. S. Pat. Off.

the switch contacts may already be warm from carrying full load, but at the instant of "make" the current is zero. Whatever over-shooting there is, has reached the maximum and is back to normal before the contacts can become appreciably heated.

With quick acting circuit breakers it becomes necessary sometimes to set them for 2 or 2½ times the normal lamp load. Where fuses are used, circuits rarely ever have to be fused for more than 1½ times normal current, because fuses are slower in their operation. However, the setting of circuit breakers and the ratio of fuse capacity to normal lamp load depends somewhat on the size of lamps used. For instance, 100-watt lamps require but 0.10 second to reach a final constant current, 1000-watt lamps require more than twice as long.

Lamp Temperatures in Refrigeration Rooms

In lighting refrigeration rooms, meat coolers, cold storage warehouses, etc., the relative heating effect of vacuum and gas-filled lamps is frequently in question. The fact that the vicinity of the gas-filled lamp is comparatively hot gives rise to the erroneous assumption that gas-filled lamps will heat the interior to a greater extent than will vacuum lamps of an equal aggregate wattage.

Such an interior usually has its walls extremely well insulated to prevent the passage of heat and light through them. The entire amount of heat and light energy is, therefore, eventually absorbed by the walls and taken up by the cooling system. Vacuum and gas-filled lamps of equal aggregate wattage emit equal total amounts of energy as heat and light, hence their effect on the cooling system is exactly the same.

It is true, however, that if meat, for example, is hung very near a lamp it may come under the influence of the local heat of the lamp and be spoiled. With the lamp a sufficient distance away no damage to the meat would result.

■

ADVERTISING in bold lettering within his store that over 1,000 lighting fixtures are displayed on the second floor, Alex L. Bear of Richmond, Va., continues to expand. A refrigerator service department is now going along nicely, with three men devoted to this work as a separate activity from the contracting and motor repair departments.

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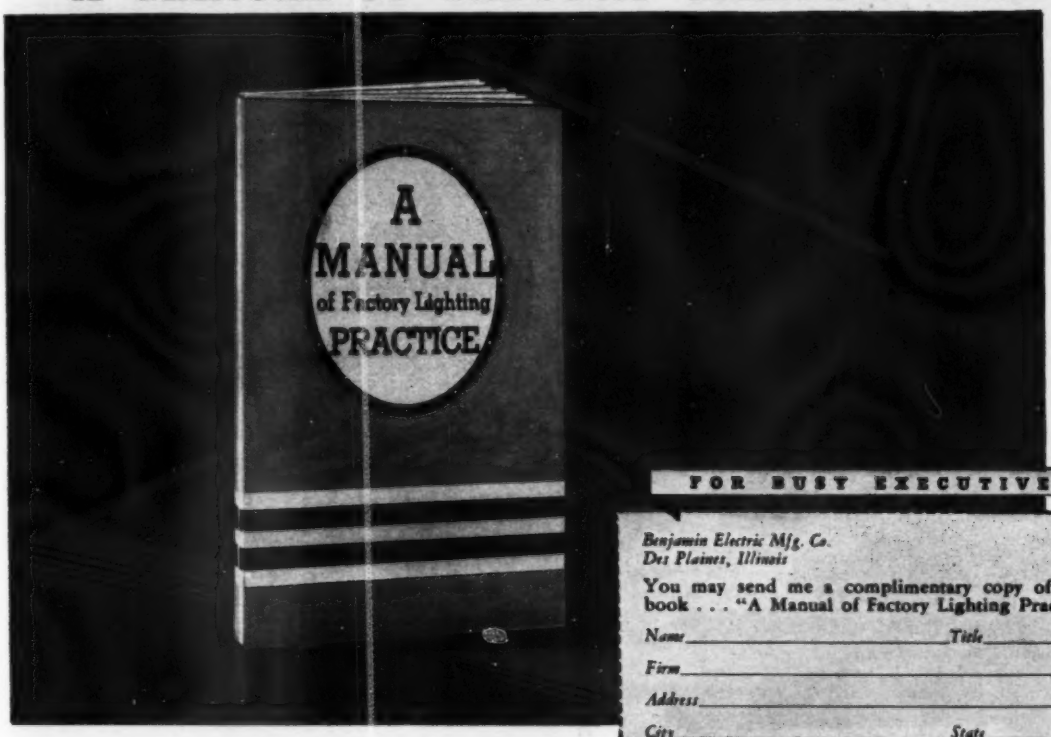
"A MANUAL OF FACTORY LIGHTING PRACTICE"



FOR BUSY EXECUTIVES

Benjamin Electric Mfg. Co.
Des Plaines, Illinois

You may send me a complimentary copy of your new book . . . "A Manual of Factory Lighting Practice"

*Name*_____ *Title*_____

*Firm*_____

*Address*_____

*City*_____ *State*_____

★ A NEW BOOK

TELLS HOW TO IMPROVE WORK STANDARDS AND CUT PRODUCTION COSTS ALL THROUGH PLANT

Here is a book every executive ought to read and pass along to his electrical maintenance engineer or chief electrician. To management, it gives a new insight into the breadth and scope of modern industrial lighting. To the operating executive, it provides the complete working data for up-to-date plant lighting.

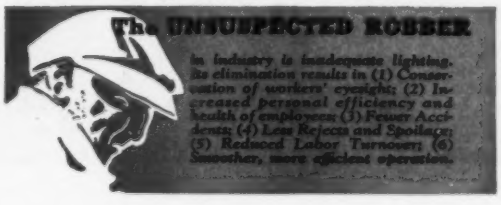
Written in easy-to-understand, non-technical language, the book outlines 30 specific lighting problems and gives a complete statement of how Benjamin Illuminating Engineers have solved each of them. A study of these problems will reveal how surprising improvements both in general and supplementary lighting often can be made at negligible cost; how easily lighting can be fitted to each plant operation with amazing improvement in work standards and lower production costs.

With the data contained in the Manual the operating executive can easily and quickly select the proper lighting to meet the "seeing requirements" of practically any operation. Typical of the subjects covered are . . . "How to secure good general lighting from the side where obstructions or building construction precludes the use of overhead reflectors" . . . "How to light spray booths . . . stock room aisles . . . drafting boards . . . signs . . . outdoor material storage dumps" . . . "How to assure getting rated life from lamps exposed to shocks" . . . "How to protect reflectors from loss of light output in dusty, dirty locations" . . . "How to light polished and non-polished parts for accurate inspection" . . . "How to check your present overhead lighting with the most modern approved standards", etc., etc.

This Manual is intended to be used as a basis for a complete CHECKUP of your plant lighting. The edition is limited—so may we suggest that you send for your copy today.

BENJAMIN
TRADE MARK
LIGHTING EQUIPMENT

Distributed Exclusively through Electrical Wholesalers


The UNSUSPECTED ROBBER
in industry is inadequate lighting. Its elimination results in (1) Conservation of workers' eyesight; (2) Increased personal efficiency and health of employees; (3) Fewer Accidents; (4) Less Rejects and Spoilage; (5) Reduced Labor Turnover; (6) Smoother, more efficient operation.

UMI

Questions ON THE CODE

Answered by F. N. M. SQUIRES

Chief Inspector New York Board of Fire Underwriters

Smaller Neutral

I have a load consisting of a 15 kw. 3-wire range and wish to add a small additional load of lights and small single phase motors to this. Can I use a smaller neutral wire than the outside wires on the feeder for this load?

The neutral of the feeder must have the same carrying capacity as the outside wires. The range, being a 3-wire range should have a neutral of the same size as the outside wires as the load on but one side of the circuit may be in use at any time. The lighting and small motor load being single phase should also have full capacity in the neutral except on a 3-wire single-phase system no neutral capacity is needed for 200-volt motors. But with a 4-wire 3-phase system using 2-phase wires and a neutral, the capacities of all three wires should be the same.

■

Alterations to Switch Ratings

I have an enclosed switch which is approved for 7½ hp. 600 volts. I have taken off the 600-volt fuse clips and substituted 30 amp. 250-volt fuse clips. My inspector tells me that he will not approve this switch now for use with a 7½ hp. 230-volt motor. Why?

This inspector is right. While the switch was rated for 7½ hp. at 600 volts it would not be rated for 7½ hp. at 250 volts. This switch would probably be listed also as a 30-amp. 600-volt switch but at 30 amps. at 250 volts would be listed only as a 5 hp. or even a 3 hp. switch.

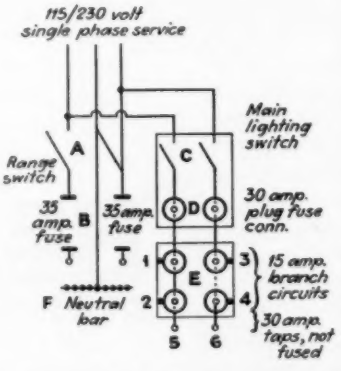
It is, of course, realized that a motor takes more current in amperes at 250 volts than for the same horsepower at 600 volts.

Another reason under which the inspector should reject the switch is that the approval listing by Underwriters' Laboratories was for the original product as built by the manufacturer and any change to the switch destroys that approval. Such a change should, therefore, be made only by the original manufacturer or by another one who also has Laboratories service and the modified device then resubmitted for approval to the Laboratories. The inspector would have no means of knowing whether a proper job had been done on the switch or not without such Laboratories approval.

■

Simplified Service Equipment

The attached sketch shows the wiring in a piece of service equipment which contains separate main line switches and fuses for a range circuit and for several lighting circuits. The main line is tapped ahead of the range switch to feed the main lighting switch, but no single set of main line fuses is provided. Taps are provided on the lighting busses for taking additional circuit capacity. Are Sections 405 and 406 of the Code fully complied with in the attached diagram?



The sketch shows a single set (three in the set) of service entrance conductors run to two sets of service equipment (A and B, and C and D). A and B, being a switch and fuse, respectively, constitute one set of service equipment and C and D likewise.

This is permitted by 405a, Exception 1, and the layout as shown is permissable under the Code rules with the following corrections:

Switches A and C, being service switches, must, according to 405d, be externally operable.

Fuse base D must, according to 405c, be of a capacity larger than 30 amp., as each fuse supplies more than two circuits.

Taps 5 and 6 must be protected by fuses and not rely on the service fuses D for circuit protection.

Fuses E and neutral bar F must be contained within the same cabinet in order to prevent induction troubles and the cabinet must, according to 405f, be provided with means for locking.

■

Asbestos Wire in Conduit

I have a quantity of asbestos switchboard wire on hand. Can this be used as circuit wire in conduit?

If the conduit is in a *permanently* dry location where the ambient temperature runs over 120 deg. F., asbestos wire may be used. Asbestos switchboard wire comes under this classification.

The rule governing this is found in Rule 500-1. The first sentence gives the requirements for rubber covered wire in general, and permission for varnished cambric wire for permanently dry locations. Then the second sentence prohibits rubber insulated wire for temperatures over 120 deg. F., and prohibits varnished cambric in temperatures of over 167 deg F., and states that slow burning (type SB) or asbestos (type A) insulation may be used in these higher temperatures (over 120 deg. F.).

■

Feeders Near Gasolene Station

An arc welding plant is to be installed about 125 ft. from a gasoline dispensing station, the current to be taken from the service station building.

Can 3-No. 6 stranded rubber covered wires strung on poles be used to run between the service station and the welding plant?

At a gasoline service station there

STILL ANOTHER YEAR PROVES
JEFFERSON-UNION FUSES AS FIRST CHOICE
JEFFERSON UNION
Renewable
FUSES
JEFFERSON ELECTRIC COMPANY

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Check these eight features; then specify
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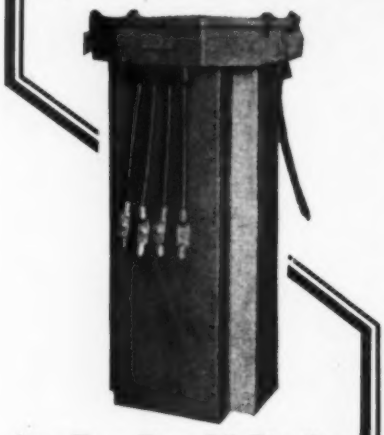

AmerTran Type RS Distribution Transformers incorporate all latest refinements and are built to meet the most exacting requirements.

1. Coils are vacuum impregnated in varnish.
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3. Transformers are shipped filled with oil.
4. Tanks are fabricated from copper-bearing steel.
5. Covers are cast from nickel-iron alloy.
6. All coils have ample ventilating ducts.
7. Transformers may be completely dismantled and reassembled with a single wrench—no other tool is required.
8. All units are of similar electrical and mechanical design (see cut) in sizes from 1½ to 100 Kva. and for potentials to 8000 V.

May we send data on equipment to meet your needs?

AMERICAN TRANSFORMER CO.
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Makers of
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Transformers of Excellence
Since 1901

are, in general, two hazardous locations. First, and most important, is the gasoline pump or pumps; second, the greasing pit or pits.

The station building itself is not generally classed as a hazardous location unless gasoline is handled therein or pumped through it.

Therefore, if the open feed wires to the arc welding plant leave the station building and do not pass close to either the dispensing pumps or the greasing pits, there is no reason why the open wires cannot be used.

■

Gas Pipe for Range Wiring

The owners of a three story building desire, if possible, to provide, during present renovations, for the use of future electric ranges but to provide at this time for the use of gas ranges. Would it be permissible to do this in either of two ways?

1st.—To install a gas pipe riser for the present use of gas and then later use this pipe as a conduit for the electric wires, or,

2nd.—Install regular electrical conduit and use it now for gas and then later use it as an electrical conduit and pull conductors into it?

There are, of course, possibilities of pursuing either course providing certain restrictions are met with.

In regards to the first suggestion, if gas pipes of sufficient size and without the use of gas "tees" and "ells," but with sweeping bends were installed it would be permissible to later use this piping as a raceway for service entrance cable or for armored cable or for flexible steel conduit. This gas piping could not be used as an electrical conduit for pulling plain wires through.

As for the second suggestion; if approved electrical conduit is installed and made gas tight there would probably be no objection to using it as a gas piping system but when the time would come to use it as a conduit for conductors, then the inspection department would have to make a careful investigation of the conduit before permitting its use.

The conduit and fittings would have to be in good condition and show no deposits of moisture, tar, or sulphuric acid, as so often found in gas lines. It would also have to be free from rust and pittings or burrs.

Also at the time of transition in either of the above cases the change would have to be complete, as it would not be permissible to have any gas present when the piping system was to be used for electric wiring.

■

Approved vs "Bootleg" Fuses

The editor of this column has again witnessed another short circuit test involving fuses in which approved labelled fuses, and unapproved or "bootleg" fuses were tested. The gyp fuses were bought over the counter at a supply store in New York City. The results of the short circuiting test proved conclusively the hazards attendant upon the use of bootleg type fuses.

In practically every instance the "gyp" fuse plug was blown to pieces and in many cases the fuse base was also destroyed or damaged beyond further use. In all cases the mica top was punctured, generally with a flash that would have resulted in a serious wound and burn to the hand of anyone who may have been inserting the fuse plug into place against the short circuit. On the other hand each labelled fuse that was tested safely opened up the short circuit. In no case did approved fuses blow through the top or damage the fuse base or the fuse plug itself other than to burn out the fuse link.

The results show conclusively that no one should attempt to insert a bootleg fuse plug into a fuse base at any time. A recent serious injury to a mechanic heightens this plea.

■

Local Requirements

I have received a copy of the National Electrical Code and wish to be set right on a few points.

First, must all work be done by a licensed man, or, is something else meant in the Code definition in Article 1 by a "qualified person"?

Second, is it necessary to have all additional outlets inspected and if so, what charges will be made for inspections?

The question as to whether or not electrical work in any locality must be installed by a licensed electrical contractor rests with that particular locality. The National Electrical Code cannot go into this matter, but can only suggest that the work be installed by a qualified person. Of course the local ordinances may stipulate the conditions under which a person becomes a "qualified person."

Where local regulations or the terms of an insurance policy require

THE UNSEEN HAND

. . . that makes this installation COMPLETELY AUTOMATIC

Shown here is a modern department store which had the right idea about lighting! Ever think about the unlimited application of Sangamo Time-Switches for this type of installation? Be the stores large or small, modern or old-fashioned ---the unseen hand will do the job of turning lights on and off more conveniently, more dependably. But . . . you must first sell the idea that "better lighting means more business"! Sangamo is willing to furnish sales amunition for this purpose - - - there!

Curtis Lighting Photo

MORE BUSINESS

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that the electrical equipments be inspected or certificate be secured, all additional work, as well as the original work, should be inspected and certificates secured. The costs of electrical inspections vary according to the territory and to what inspection department makes the inspection. Some governmental bureaus charge for their services while others do not, their expenses being borne by the taxpayers. Practically all the insurance bureaus, however, charge for inspections according to schedule of charges which they issue.

■

Armored Cable Fire

Our December columns included a letter from an electrical contractor who had experienced a puzzling armored cable fire. In our comments we mentioned having written for additional information and that comments from our readers were also requested. To date no replies have been received from others but we have further word from the contractor.

Our original letter to the contractor read, in part,—

"It appears that the fire in the garage circuit was due to a ground developing from one of the hot wires to the armor of the cable system. This ground developed heat in passing in the neighborhood of a 15-amp. load. Thus current did not blow the fuse on account of the resistance in the armor due to the long run and to the ineffectiveness of the ground to the artesian well pipe."

The contractor has now confirmed this explanation by stating that the cable in question was the tail end of the circuit. He has also observed that the ground which caused the trouble was in the outlet box which housed a 3-way switch in the garage. There was no evidence of overheating from any other cause, because tests made at other outlets for a ground produced a good light from the hot wire to the cable sheath or box.

The above incident shows the absolute need for an efficient and effective grounding connection for both the armor of cable systems and for the supply system neutral conductor. It also serves warning that circuits must not be overfused.

While this contractor's problem involved a circuit fused 15 amp., a fire occurred just the same. Larger fuses and slightly lower ground resistance might have done greater damage.

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DATA SHEET

P&S

Rx Use P&S-Despard wiring devices for maintenance work - all jobbers stock covers to allow their use on existing fittings.

- A Few of the Standard Fittings Available for P & S-Despard Wiring Devices.

P&S-DESPARD WIRING DEVICES

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January EDITORIALS

EARL WHITEHORNE
EDITOR

Rural Wiring Gone Wrong

Many contractors are worried over the farm wiring situation. When the rural electrification movement began, they saw a new field opening up for electrical construction, a new market for their services. But the prospects have gone very sour in many sections.

Silver tongued apostles of the "more abundant life" have told the farmers not to pay full price for anything electrical. The "co-ops" sell them materials at cost. Some soda-jerker, with borrowed pliers, strings their wire at ten dollars a job. And the power company connects them up without inspection. The contractor knows the wiring is not safe. But all he can do is curse and tear his hair, while the established standards of his craft are hamstrung from the rear.

This is very bad, but like a lot of bad things, it is not hopeless. For if this wiring is unsafe and inadequate the farmer is going to find it out and have the job made right by somebody who knows his trade. Also, the power companies, which are now cutting in these installations, because they do not want to appear to buck the Government's program, will tighten up when farm buildings begin to burn. In short, there will be an eventual reaction that will bring a lot of re-wiring work to the contractors. But there is another side to it.

Farmers know quality in automobiles, in mowers, in stock, in seed but not in wiring. The Government has been good to them in many ways and they are naturally taking the advice of those who seem to speak for this appealing Federal program. And nobody has sold them the value of quality in electrical work, as the motor car and fertilizer people have done. So the farmer does not seek out the contractor. He buys where the promise and the price sound good — and that is nothing unusual.

The cure for this trouble lies in selling. True, ten dollar or fifty dollar labor jobs are not worth going after. But men who buy tractors and pure bred bulls will buy good wiring too — if they are sold. And there are lots of them along the country lines.

Tell It To The Farmer

Despite the mischief made by over-zealous representatives of Washington and local "co-ops" in their tall talk at farmers' meetings, the R.E.A. has done one thing of great value to the contractor. It has widely distributed an interesting bulletin entitled —"Wiring Your Farm Home". And in it are these words—

"Make sure the wiring job is carried out by a competent electrical contractor, thoroughly experienced in farm wiring. He knows how to lay out the technical details of a wiring plan which will put the electricity where you want it. When the job is finished it should be checked by an electrical inspector and a certificate of inspection obtained. This will insure your job meeting the requirements of the National Electrical Code, the Underwriters specifications and any local or state code, which may apply — *Don't Forget the Inspector.*"

What better ammunition can any contractor want for use in selling the farmer? It is a clear cut endorsement of quality materials and skilled workmanship. It is a definite warning not to permit irresponsible persons to install wiring. It stresses the need for an inspection. No one could ask the government to put it more plainly.

This kind of advice from R.E.A. may not be taken seriously by some of the little fellows who want six lights in a rural home. But the farmer with a real property, accustomed to buying good machinery, will listen when this bulletin is used.

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And if good farmers buy good wiring from good contractors, it won't be long before the rest know why.

Estimating Labor Costs

Estimating is going to be harder this year. Large rush jobs, that offer $120 in the weekly pay envelope, are drawing reliable men away from established contractors they have been with for years. Staffs must be hastily recruited and that means less dependable production, inefficient work, poorer cooperation with other trades, slower jobs and higher costs.

It does no good to blame these workmen who grab a chance to cash in on rush-job money when it offers. And as competition for mechanical skill becomes keener, there will be more of it — not less. In face of these conditions, the estimator cannot rely on his records of past operations, no matter how complete they may be. As to the backlog of estimates on postponed jobs, now blooming into orders, he may be protected by clauses, that make them not binding if wage levels advance. But the problem is not one of wage levels but of what hours of work accomplish.

It is a time for sound judgment in planning and supervising jobs. And the estimator can find more security in close observation of changing conditions and in frank exchanges of experience with other contractors, than in dependence upon accurate calculation of estimating units.

Settle It In Court

Ten manufacturers of electrical equipment have brought suit against Local No. 3 of the International Brotherhood of Electrical Workers, in the Federal Court of New York. The details appear on another page. Heavy damages are demanded on the grounds that local contractors are prevented from using equipment not purchased from local manufacturers whose products bear union approval. A similar suit by a smaller group of manufacturers was filed some time ago.

All contractors will watch the progress of this litigation with keen interest. The right of labor to organize cannot be questioned, nor the right of men to work unorganized, if they desire. Likewise the right of manufacturers to operate their plants with either union or non-union employees and to sell their products freely in any state, would seem to be unassailable, as is the right of contractors to run an open or a closed shop. All this lies in the realm of individual preference and business policy.

But when over-zealous advocates of either doctrine use force to prevent those who do not agree with them from enjoying this freedom of choice, then the trouble begins, followed too often by physical violence and financial loss. It is a poor way to settle a question of right and privilege.

This law suit may not end the argument nor improve the condition. It may not bring satisfaction to either side. But it is at least an orderly attempt to bring this issue into court and to determine what rights are involved under the American system. Both parties in the case should be willing to follow this procedure through to a definite decision.

To Help You Buy

Contracting is a business. Business is created by good selling. But good buying makes money too, just as poor buying loses it.

So the fact that around 13,000 contractors and some 5100 chief electricians in industrial plants have just received copies of the new Buyers Reference, distributed as Part Two of the December issue of Electrical Contracting, is of more than passing interest. It places on the desks of all these buyers of electrical materials and equipment, a dependable guide to what they need and an accurate time saving method of locating it.

Men get into buying ruts. They use what they have, instead of the special fitting that the job calls for. They lean on a pet salesman and order what he says because it is easy. But it is not smart. With the full scope of the market now at their finger tips in this new Buyers Reference volume, it is better to form the good habit of intelligent selection.

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High Lights IN THE NEWS

TEN MANUFACTURERS SUE NEW YORK UNION

Claim Damages of $1,350,000 for Conspiracy to Keep their Products Out of the Local Market

Ten manufacturers of electrical equipment have filed a joint suit in the Federal Court of New York against Local No. 3 of the International Brotherhood of Electrical Workers. They claim damages of $1,350,000 under the anti-trust law, charging that this local has restricted the market for electrical equipment, by waging industrial warfare against buildings and businesses that attempt to use equipment that bears no union label.

The suit also charges that various departments of the City of New York have failed to carry out their statutory duty of awarding contracts to the lowest bidders, if these bidders are not in favor with the local. The plaintiffs are — General Electric Co., Clark Controller Co., Colts Patent Fire Arms Mfg. Co., Cutler Hammer, Inc., Electric Controller and Mfg. Co., Okonite Co., Square D. Co., Trumbull Electric Mfg. Co., Westinghouse Electric and Mfg. Co. and Reading Chandelier Works. Nine officers of the local are also defendants.

Walter Gordon Merritt, attorney for the plaintiffs, states that this local union "so completely dominates the electrical contractors in New York City, who are the principal outlet for the sale of such electrical equipment, that they are forbidden to take any electrical contracts which do not provide that the contractor shall purchase the equipment to be used." The local union, moreover, forces them to limit their purchases to companies approved by it. These are local union manufacturers, who have entered into agreements to employ its members only, on condition that this local union shall force all contractors and other purchasers of such electrical equipment, in the metropolitan area, to deal only with this favored few, who are described as boycott beneficiaries.

According to the complaint, the plaintiffs, who are large open shop manufacturers principally located in other states, may sell their products for use in the metropolitan area, only provided they first unwire them and disassemble them after the factory tests, and then ship them to the metropolitan area, where they must be rewired and reassembled by the local union members. It is alleged that by this duplication and waste of human effort, additional economic burden is passed on to the people and tax payers of the City.

This domination, it is claimed, is enforced by strikes and threats of strikes against building operations. These methods "have deprived electrical contractors of freedom of choice in the selection of equipment and built a Chinese Wall about the City, which deprives the public of the right to purchase and use electrical equipment of a better quality or lower price than that which is being forced upon them."

Fifteen local manufacturers of electrical equipment, the complaint says, have working agreements with Local No. 3 that guarantee them protection from competition by electrical manufacturers outside this state. These contracts "have artificially increased their sales at prices higher than" those charged by the plaintiffs. It is also charged that 90 per cent of the electrical contractors in this area have been coerced into signing contracts with the union, "knowing that they are narrowing the market for the products of manufacturers not approved by the union."

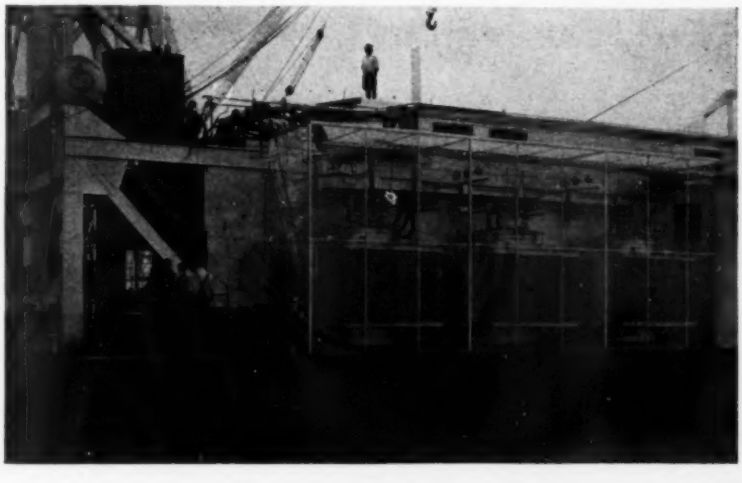
Thomas Heads NEMA Adequate Wiring Promotion

The first meeting of the recently formed Adequate Wiring Promotion Committee of the National Electrical Manufacturers Association was held at NEMA headquarters on December 14. The members of this committee are: George C. Thomas, Jr., Thomas & Betts Company, chairman; D. H. Murphy, The Wiremold Company; C. L. Nicholson, Pass & Seymour, Inc.; F. A. Parnell, General Electric Company; H. E. Seim, Bryant Electric Company; and J. A. Smith, Anaconda Wire & Cable Company.

This meeting marked the initial step in the development of the basic framework of a national promotional plan. Three general phases of activity were considered necessary, namely:

1. Arousing the interest of the public in the comfort, convenience, economy and safety of adequate wiring installations in homes.
2. Developing a simple and practical plan for local operation.
3. Enlisting the active interest and support of the several hundred thousand individuals employed in various branches of the industry.

The committee appointed as ex-officio members four men now hold-



FLOATING POWER: The electric dredge "Marshall C. Harris" is said to be the largest craft, or what have you, of its type on the Pacific Coast. Its 15,000-volt outdoor switchhouse and substation is a part of the electrical installation that was recently designed and executed by the Pacific Electric Motor Co. of Oakland, Calif.

TIME EXTENDED

Your old window lighting shades still worth $1.00 each!

Good news to those merchants whose frenzied trade of the holidays left little time to indulge in store modernization. You can still get X-Ray better show-window lighting at the lowest price in history!

The Curtis TRADE-IN-OFFER has been extended! But, "Make hay while the sun shines" . . . turn in your antiquated lighting shades now and get $1.00's value for each on new X-Ray Reflectors . . . the powerful show window reflectors that put brilliant light on the "Attraction-Zone" and make your merchandise sell.

Details of the Curtis TRADE-IN OFFER are yours for the asking . . . tear off the coupon, sign your name, mail it today.

Curtis TRADE-IN offer

Mail Coupon **TODAY** *for further details*

X-Ray TRADE MARK REG.

OW WINDOW LIGHTIN

LIGHTING SALESMEN: This advertisement is appearing in retail journals in every field. For you, Lighting Salesmen, it means *now* is the time to cash in on this Big X-Ray reflector market!

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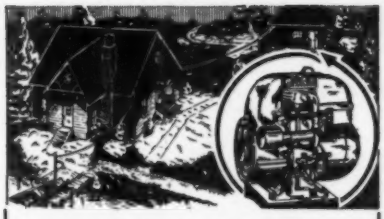

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These A.C. Plants operate RADIO, HOUSEHOLD APPLIANCES, WATER PUMP, MOTORS—anything that normally would operate from city lines. Will run Public Address and Sound Car Equipment.

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ONAN PLANT Engines are like the Motor Car, Truck or Tractor engines. Operate on Gasoline, Gas or Distillate. Wiring and Installation is the same as for standard applications. Also 32 volt, Direct Current Models.

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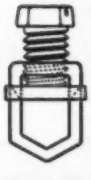
ILSCO

SOLDERLESS CONNECTOR

NOTICE: The *triangular wedge* formed by the tang and V-bottom collar, which forces the wire into a *solid mesh*—



NO set-screw contact . . .
NO flattening or separating of wires . . .
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NO shearing effect whatsoever . .
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NO need for you to search any longer for the PERFECT Solderless Connector—WE HAVE IT!

Ilsco solder lugs show the size of the largest wire they will take.

FREE—A large display board, containing mounted samples of ILSCO lugs. Sent upon request.

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ing key positions in N.E.M.A. committees that are interested in business development. These ex officio members are: H. J. Mauger, Edison General Electric Appliance Co., Inc.; R. W. Staud, Benjamin Electric Mfg. Co.; C. E. Swartzbaugh, The Swartzbaugh Mfg. Company; and F. U. Webster, Cutler-Hammer, Inc.

With the fundamentals of the program agreed upon, such other matters were considered as: A slogan for the campaign, a name for the plan, methods of certifying adequately wired homes, and methods of financing the program.

PAINT INDUSTRY TO STRESS LIGHT

One session of the recent National Paint, Varnish and Lacquer Association Convention was set aside to a discussion of Better Light—Better Sight as related to the painting and decorating business. An associate executive advised the painting industry to capitalize on the eye-conscious viewpoint of the public, and to "Ride this surging wave of improving seeing conditions and provide painted surfaces, which will give people more light."

The best kind of a painting job, it was stated, will not show up properly unless the interior is properly lighted. Only since the Better Light—Better Sight campaign was inaugurated has a tie-up between light and paint really been emphasized.

■

SPECIAL motors for ten or more makes of oil burners and stokers are kept in stock by the General Electric Specialties Co., Jamaica, (L.I.) N. Y. for emergency exchange calls on breakdown cases. This equipment is stocked for quick customer service only and is not offered for re-sale as used equipment.

■

EXPANSION to an adjoining building was recently completed by the Electrical Equipment Co., Inc., Richmond, Va., which now provides new offices and more adequate parts and apparatus display and storage space. When motors are completed in the service shop for stock or for future delivery, they are delivered by a monorail system into the new quarters.

■

TRENDS in factory safety point toward the increasing use of polarized wall receptacles. In a radio tube factory that was recently wired by James Wilkinson and Company of Boston, Mass., each receptacle outlet in both factory and office is of the three-contact type. The cords on all portable tools, office machines, fans, etc., are 3-wire, thus providing a grounding conductor for the elimination of personal shock hazards.

TOTAL MILES OF R.E.A. LINES

Eight thousand miles of rural lines can be credited to the Rural Electrification Administration, as completed by the end of 1936. This is the actual progress made with the Government's program, in which 32,000 miles of construction has been authorized and $35,578,178 has been allocated.

Detailed figures are available only up to October 30. At that time $5,290,872 had been actually spent on contracts in 18 states, distributed as follows:

State	Total Mileage	Customers Served	Amount of Contract
Alabama	51.4	238	$43,390
Florida	66.3	267	62,900
Georgia	102.5	350	82,442
Idaho	40	250	41,244
Illinois	70	173	49,396
Indiana	569	1,835	481,594
Iowa	277.6	547	304,508
Kentucky	12.6	77	12,227
Minnesota	518.4	1,757	463,003
Mississippi	55	300	66,741
Nebraska	1030.8	2,816	901,457
North Carolina	77	220	70,610
Pennsylvania	128	623	114,079
Ohio	1496	5,900	1,426,994
South Carolina	375	1,431	272,292
Virginia	318	930	270,023
Wisconsin	561	1,477	375,376
Texas	361	1,200	252,596
	6109.6	20,481	$5,290,872

On November 30 there were 3,432 miles of lines reported completed and 1,920 miles energized. The actual expenditure on that date totaled $5,534,539.

TORONTO RED SEAL COMMERCIAL MODERNIZATION

The Electric Service League of Toronto, Ont., has published an 8-page illustrated bulletin entitled "The Modernization of Commercial Buildings for Better Lighting" which contains a minimum Red Seal specification for adequate wiring of lighting circuits in commercial and public buildings. These specifications are divided into three parts: (1) Requirements for all commercial and public buildings, (2) additional requirements for stores, and (3) requirements for convenience outlets and circuits. Specification paragraphs applying to branch circuits, panelboards, conduits and ducts, show windows and signs, complete this bulletin.

An introductory text stresses the importance of adequate wiring as the foundation of good lighting. Explanations are made to the effect that cheap wiring installations are usually the most expensive. The illustrations point

YOUNGSTOWN

BUCKEYE CONDUIT

★Conduit buyers who standardize on BUCKEYE Conduit protect themselves from all risk of irregular quality.

YOUNGSTOWN metallurgists and inspectors have perfected an intensive production-control which holds every shipment of conduit rigidly to standard.

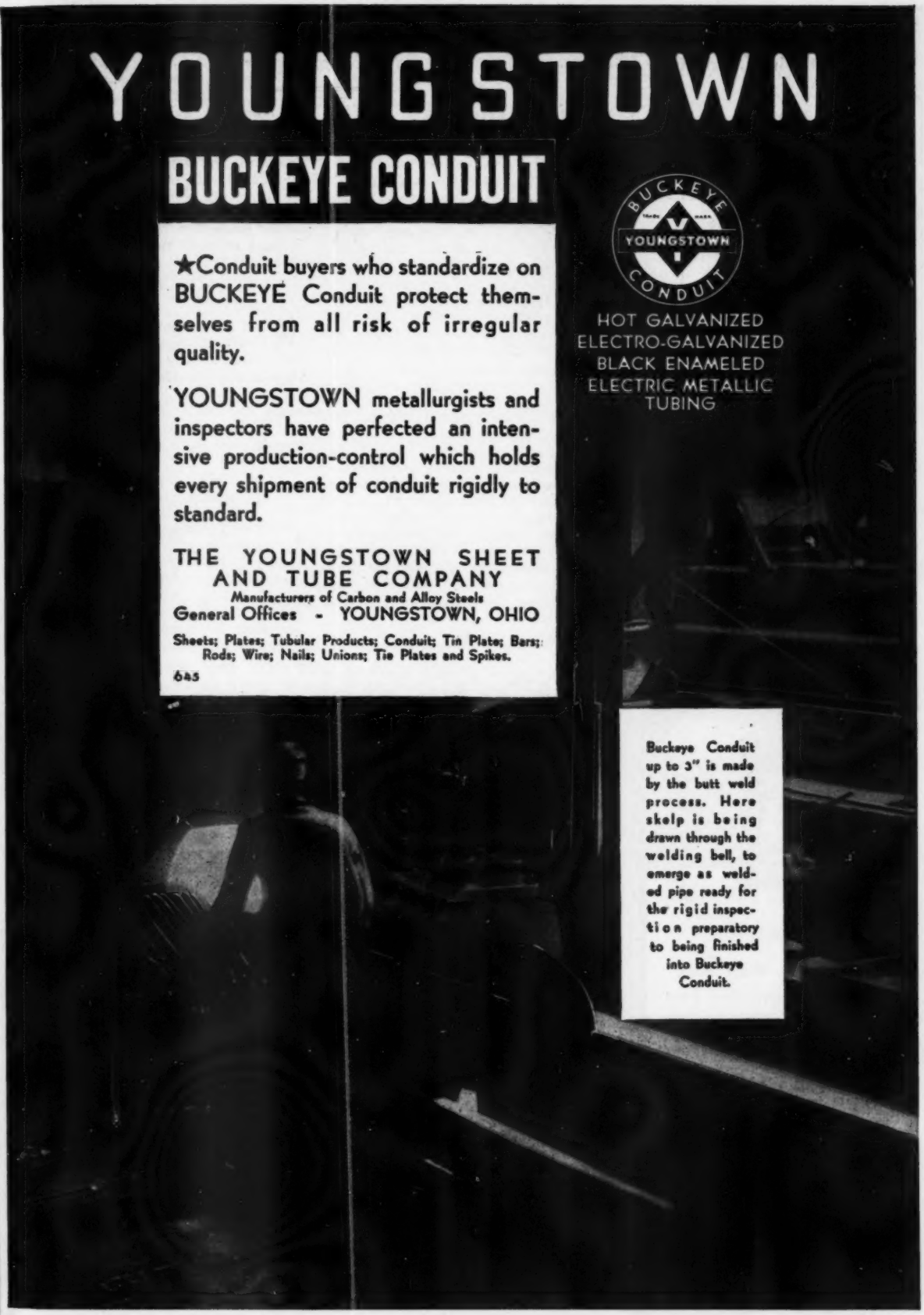
THE YOUNGSTOWN SHEET AND TUBE COMPANY
Manufacturers of Carbon and Alloy Steels
General Offices - YOUNGSTOWN, OHIO

Sheets; Plates; Tubular Products; Conduit; Tin Plate; Bars; Rods; Wire; Nails; Unions; Tie Plates and Spikes.

645

BUCKEYE YOUNGSTOWN CONDUIT

HOT GALVANIZED
ELECTRO-GALVANIZED
BLACK ENAMELED
ELECTRIC METALLIC
TUBING



Buckeye Conduit up to 3" is made by the butt weld process. Here skelp is being drawn through the welding bell, to emerge as welded pipe ready for the rigid inspection preparatory to being finished into Buckeye Conduit.

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The MARR
A Perfect Joint Connector
(CAP MADE OF BAKELITE)

WRITE TODAY FOR

FREE SAMPLES

We want you to prove to your own satisfaction that Marr connectors will save you time and money. Just drop us a card, and you'll get free samples by return mail. Write today, and profit tomorrow with Marr.

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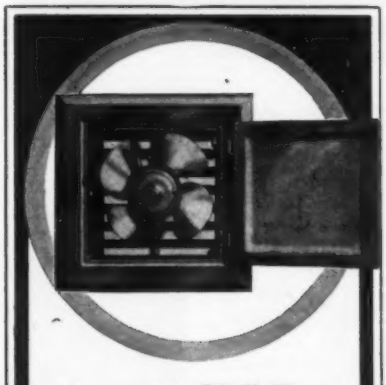
NEW HAVEN, CONN., U. S. A.
GENERAL SALES AGENTS HATHEWAY AND CO.
220 CHURCH STREET NEW YORK, N. Y., U. S. A.



Automatic Wall Box
Kitchen Ventilator Fan

Built-in type for permanent installation, it is telescopic in design, adjustable to wall thickness 7" to 13". No wood or metal frame or screws in the plaster, wood, or brick necessary. Inside and outside polished cast aluminum; wall box rust resisting steel. Quickly installed in old or new homes. Automatic switch and shutters controlled by opening and closing of the door. 10" silent blade fan; available for A.C. or D.C.; A.C. non-radio interfering. Write for bulletin and prices.

SIGNAL ELECTRIC MFG. CO.
Menominee, Michigan, U. S. A.

OFFICES IN PRINCIPAL CITIES

SIGNAL

out how existing structures can be rewired for adequacy with surface wiring materials without becoming unsightly.

NORTHERN CALIFORNIA ELECTS OFFICERS

At its annual Convention held in Sacramento on December 5, the Northern California Chapter of NECA elected the following officers: Frank E. Boyd, Oakland, president; Del O'Connor, Sacramento, first vice-president; Ted Curry, Fresno, second vice-president; Edward Martin, San Francisco, secretary-treasurer; H. H. Courtwright, Roy Butcher, Harry Eklund, Seth Cohn, Clyde Chamblin and Les Poland, directors.

The convention program included a review of the activities of the Contractors' License Board by Roy Butcher, chairman of that body. During the year this organization refused 28 per cent of applicants for license examinations because of inadequate qualifications under the law. About 19 per cent of the remainder were required to furnish more details. With electrical contractors numbering 1509 in California the renewal of licenses last June revealed about 38 per cent who were not carrying the proper compensation insurance.

■

WHAT price elevator maintenance service, asks W. H. Beard, New York (N. Y.) Armature Works, Inc., when some service shops must carry an investment in spare armatures and other parts to the tune of $10,000 or more. Competition has become so keen that the shop without such an investment isn't in the running with some building operators.

■

THE contractor who is considering putting in a good display of lighting fixtures must get $600 to $750 fixture sales per month, says J. R. Woodhull, Jordan Electric Co., Topeka, Kan. There is ever the hazard of slow-moving items, which because of obsolescence may require sacrificing a $40 piece for $5 to dispose of it. Obsolete items are bad for the display room, Mr. Woodhull believes.

RATINGS FOR BETTER CONSTRUCTION

AS a means to bring about improved standards of building construction, a service known as the Certified Building Registry of the United States, has been established in New York. It proposes to provide mortgaging agencies with certificates of structural rating, these to be paid for by the owner like a fire insurance policy. Major lenders would require such a certificate as a condition of their loans for refinancing, for new construction or for modernization operations.

This is pointed out as a protection to both the lender and the owner against poorly built structures, that would be erected in the prevailing pressure for low first cost. It is claimed that the establishment of structural ratings would also aid appraisals of property. The service is likened to the present registry of ships, which is said to have resulted in improved standards.

■

WHAT TVA has meant to electrical contractor-dealers doing business within that area is not easily evaluated, says Herbert Haile of the W. C. Teas Co., Chattanooga, Tenn., except that range and water heater sales and installations exceed in some weeks the annual total sales during earlier years.

■

COMEBACKS on "shoemaker" motor repair work in New York are claimed to average from 20 to 30 per cent, which prompts H. Josephson of the H. J. Electric Co., Inc., New York, N. Y., to report a record of below 5 per cent in complaints on his company's shop production.

WORLD'S FAIR WORK ON COMPETITIVE BIDS

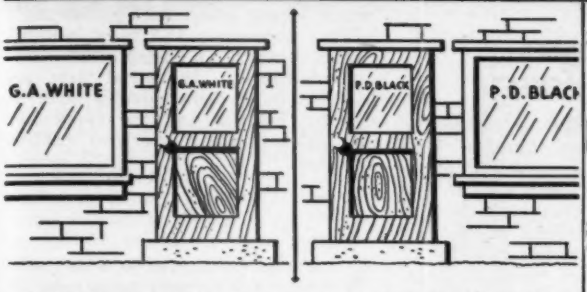
All contracts let by "New York World's Fair 1939 Incorporated" shall be on the basis of competitive bids, it is announced in a recent notice to contractors. Any individuals, firms, or corporations who desire to bid on any construction work to be let by contract, must be pre-qualified before their bid can be considered. Pre-qualification forms for prospective bidders will be mailed to them upon written request.

■

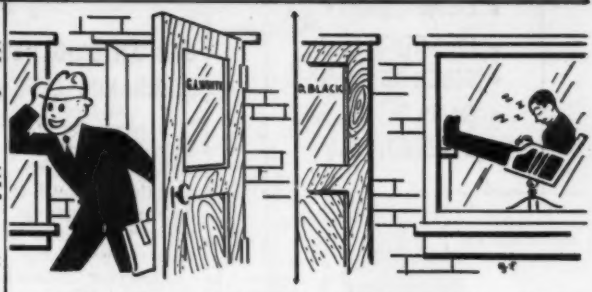
A LARGE radio tube manufacturing plant was recently wired by James Wilkinson and Co. of Boston, Mass., with 32 loudspeakers located in its principal work areas. These speakers are used for broadcasting musical programs to the workers at regular periods of the day, for making special announcements, and also as a general paging system for the plant executives by means of a code signal transmitter at the telephone switchboard.

A program clock device automatically transmits the starting and dismissal signals for all working periods of the day over this system, and all speakers are left in circuit for paging the plant watchman at off hours by means of

THE ADVENTURES OF BLACK & WHITE



ONCE UPON A TIME THERE WERE TWO CONTRACTORS—GOOD ONES, TOO!



BUT ONE, WHITEY, SEEMED TO GET MOST OF THE BUSINESS . . .

"Look, Mrs. Jones, why this BRYANT QUALITY SWITCH has got everything that most switches haven't got."

"Look at this Bryant Switch . . . see the swell workmanship . . . Bryant tests assure safe and lasting operation . . . feel the ease of operation . . . the spring is made of the finest quality of steel . . . etc. . . . etc."

THEY'D BOTH BID ON THE SAME JOBS— BUT HERE'S WHY WHITEY GOT THEM

Typical BRYANT leaders in the Wiring Device field

NO. 4963 FLUSH TOGGLE SWITCH

NO. 3750 FAN HANGER RECEPTACLE

NO. 4832X DUPLEX RECEPTACLE

NO. 3826 RANGE RECEPTACLE

NO. 3799 RADIO RECEPTACLE

NO. 3799 CAP FOR #3799 RADIO RECEPTACLE

"And here are a few more sure-fire arguments I use:"

"Boy, do I go to town on BRYANT QUALITY arguments? And do prospects listen? The depression taught 'em plenty about price buying. But now times are better and they'll buy the best if you'll talk up *quality*.

"I tell the missus how I've installed the latest smart-looking BRYANT Ivory devices in the best houses in town . . . that always gets her.

"I say, sure, I'll install other devices if they want *but* I want to do a *good* job. That makes the man listen.

"There you are, fellows, BRYANT QUALITY gets me the business—I do a job that's bound to last—and *collect*. No, sir, it isn't sense saving a few cents, then spending valuable time doing a job over again."

BRYANT

Sold through your BRYANT *Electrical Wholesaler*

THE BRYANT ELECTRIC COMPANY • BRIDGEPORT, CONNECTICUT

NEW YORK 100 East 42nd St • CHICAGO 844 West Adams St • SAN FRANCISCO 325 Ninth St

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SHERMAN
SOLDERLESS LUGS

- LOW COST
- PRACTICAL
- STRONG
- SIMPLE
- DEPENDABLE

APPROVED BY UNDERWRITERS

UNIT ASSEMBLY PURE COPPER

Patented

Screw can't come out
Rigid assembly
No loose parts
Easy and quick to use
No special tools required
Lighter and stronger than cast lugs
Grips wire at all points

SEND FOR SAMPLES AND BULLETIN NO. 15

SOLD THRU JOBBERS

H. B. SHERMAN MFG. CO.
BATTLE CREEK, MICH.

THE Badger 50 AMPERE
Synchronous
TIME SWITCH
. . . dependable
. . . at low cost

Here is a time switch that you can depend upon to give absolutely satisfactory service.

Sell quality and eliminate costly service calls.

See your wholesaler or write for complete descriptive literature.

RELIANCE AUTOMATIC LIGHTING CO
1937 Mead Street Racine, Wis.

the main entrance push button. Three amplifier panels and circuits are employed, giving a choice of three optional divisions of the factory to be included in the musical broadcasts.

■

SAN ANTONIO RESUMES ORDINANCE ENFORCEMENT

A new city electrical ordinance has been enacted in San Antonio, Tex., which includes the appointment of an examining board to administer it. This action restores to that city the full right to enforce sections of the law that were repealed in October 1933.

The new ordinance provides penalties for violations of the installation requirements, restricts work to qualified contractors, and standardizes the quality of electrical merchandise offered for sale in that city. The new ordinance has received the endorsement of a committee of the local Chamber of Commerce who pledged cooperation in its enforcement.

■

THE motor service shop cannot hope to meet ridiculous prices that are sometimes quoted, by lowering its standard of workmanship and insulation, or by cutting off the gross profit. But neither can an intelligent owner afford to buy cheap or "gyp" motor work, if his cost of pulling motors from the plant and the production losses incurred are properly charged up against petty savings, says J. M. Cutliff, of the Electrical Equipment Co. This company operates shops in Richmond, Va., Raleigh, N. C., and Augusta, Ga., and the foregoing sales policy governs its three plants.

■

SMALL reconditioned motors that are stocked for exchange service are packed in labelled paper cartons by the S. J. O'Brien Sales Corp., New York, N. Y. This method is said to be justified in order to preserve the like-new finish until the motors are taken out of stock.

■

FOR BUFFALO INDUSTRIES

An "Electrical Modernization Handbook and Survey Guide for Industry", has just been published by the Industrial Committee of the Electrical League of the Niagara Frontier, Buffalo, N. Y. It is an outstanding accomplishment, one of the best contributions made so far by any league group. Comprising thirty-two 6-in. by 9-in. pages in a spiral binding, and printed in two colors, this handbook encompasses all the major phases of its subject with a carefully selected group of explanatory illustrations to support the text.

The introduction: "A lesson from the past" is a logical foreword to the sections that follow on "the economy of electrical modernization; lighting surveys; the right motor for each job; modern electrical control; air conditioning; individual drives; electronic tubes; plant wiring; electrical heating processes; and plant modernization surveys" (a listing of 40 points to investigate). Industrial data are included in various sections such as lighting practice and the application and calculation of electrical heating processes.

■

NOW that the industries which were hit by last spring's floods have experienced steady operations for some time, many of them can appreciate the value of having qualified motor service shops take care of their equipment, says James M. Smith of Stearns, Perry & Smith, Boston, Mass. Expensive failures have occurred in some plants because after the flood had receded proper care was not exercised to put silt-laden motors into first class condition.

■

BECAUSE bearing displays accumulate dust and lose their shiny appearance, the Refrigeration Motors Corp. of Long Island City, N. Y., has its samples arranged in shallow glass-protected wall cases.

■

SINCE every large service shop is forced to take care of a considerable number of small motor repair jobs for its good customers, it behooves them to make this department as efficient as possible in order that such work pays its own way, says H. I. Lamb of the Electrical Equipment Co., Richmond,

WIRES AUGUSTA'S BRIGHT SPOT: A rush job of re-wiring in the Georgia Power Co's new quarters at Augusta, Ga., was recently completed by the Carter Electric Co., that provides adequately for delivering 35 to 45 foot-candle lighting values on two main floors. The main sales floor has been circled with flush plugging strips for demonstration outlets, wired with a No. 10 circuit for each 10 ft. of strip. C. E. Carter goes in for heavy commercial and industrial work, having just received contracts for re-wiring Augusta's city hall, and for wiring an addition to a local medical college. Office routine is in charge of Miss Marie Scott.

Va. This company's present expansion program, therefore, provides for setting up a separate small motor repair department.

NINE REA PROJECTS $941 PER MILE

An average cost of $941 per mile is reported for nine REA projects selected from eight scattered states according to Rural Electrification News. This sum includes a variety of figures involving extra costs, such as tree trimming, clearing right-of-way, rock excavations, relocating telephone lines, river and railroad crossings, road curvatures, and substation construction. These extra costs are estimated at $67 a mile of construction.

The probable average cost per mile of rural electrification lines for straight-line construction, therefore, would be approximately $874 from an examination of 1,511 miles of lines involved. A little more than 20 percent are multiphase lines. The customer density averages 3.8 per mile.

■

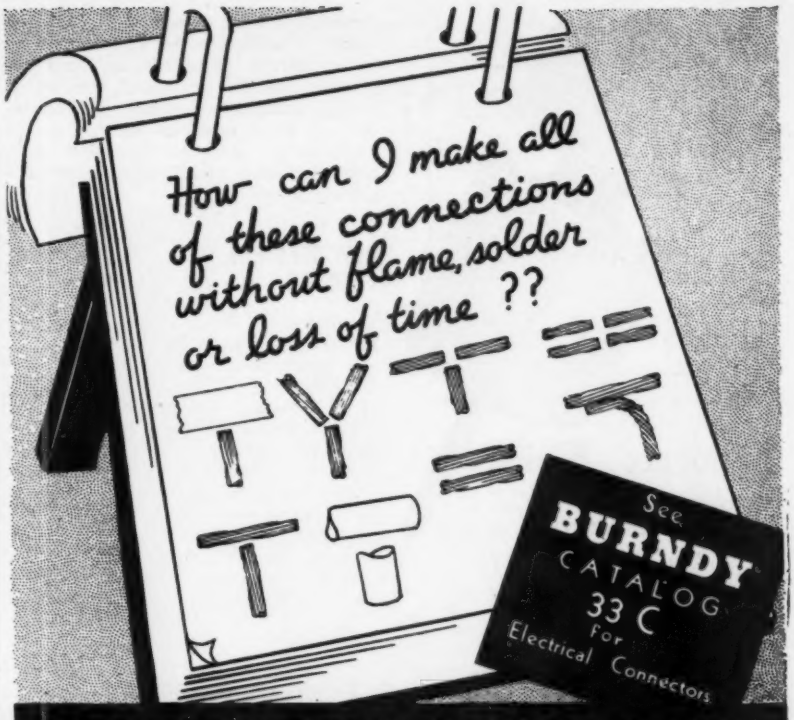
BUSINESS created in Toronto, Can., by the Electric Service League in eleven months of 1936 is summarized as amounting to $385,000. Of this sum electrical contractors benefitted to the extent of: $8,000 for 800 heavier Red Seal services; $10,000 for 950 range circuits under Red Seal; $45,000 for larger panels, added switches and 10,000 more convenience outlets; $65,000 through a 300 k.w. increase in commercial and industrial lighting and wiring; $8,000 for Red Seal store wiring; and $10,000 for Christmas decorative lighting.

FARM WIRING SPECIFICATION FORM

Proposed forms for farm wiring have recently been prepared by the Minnesota Electrical Council which greatly simplify the contractor's work in preparing a written proposal. Because farmstead wiring usually includes one or more spans or feeders, and several buildings additional to the residence, this form provides a convenient means for giving a detailed written description of the work that is covered together with 18 items of general specifications and conditions.

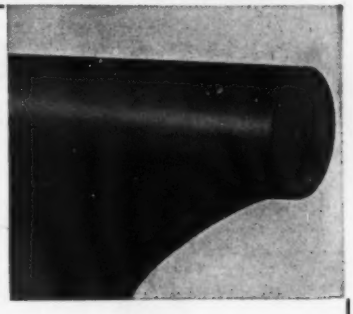
■

INNOCENT purchasers of "gyp" wiring find their first grief when the lighting fixtures are being selected. Some of the mistakes that come to light, as cited by P. P. Hebert, lighting specialist for the Seastrunk Electric Co., Columbia, S. C., are: Outlets not



BURNDY ENGINEERING CO.
459 EAST 133 STREET NEW YORK CITY

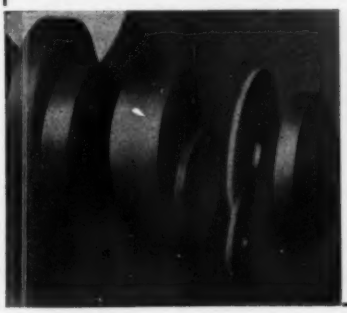
DIAMOND INSULATION



DIAMOND INSULATION is an exceedingly tough thin insulation developed primarily for use as an insulation for armature slots and field coils.

DIAMOND INSULATION will stand extreme bending without cracking. In addition to toughness, it possesses a hard surface which resists the abrasive action of rough spots in the machined slot. These properties make it an ideal material for armature and field coil insulation.

DIAMOND INSULATION is made in sheets and continuous rolls, or it may be had in ribbon rolls for automatic machines. It is furnished in a natural dark gray color only, no pigments or other coloring matter being used in its manufacture. Continuous rolls and ribbon rolls are supplied in thicknesses from .004" to 1/32". Sheets approximately 48" x 80" are supplied up to and including 1/8".



CONTINENTAL-DIAMOND FIBRE CO.
NEWARK, DELAWARE

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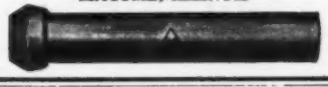
Residence Wiring

The Best and Safest Method is a properly installed KNOB and TUBE job. Be sure and get the

TRADE MARK Bull Dog REGISTERED

Assembled Knob because it "HAS A GRIP LIKE ITS NAMESAKE."

ILLINOIS ELECTRIC PORCELAIN CO.
MACOMB, ILLINOIS



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Cable or Conduit Hanger

Jiffy Clip

Now furnished in EVERDUR as well as Cadmium Plated Steel.

Cable or Conduit Hanger
Rigid Conduit—⅜"—2½"
Thin Wall—½"—1½"

Jiffy Clip
Rigid Conduit ⅛"—1¼"
E. M. T. (Thin Wall) ½" & ¾"
Also BX Cable

Ask your Jobber

MINERALLAC ELECTRIC CO.
25 No. Peoria Street, Chicago, Ill.

New York City Branch
381 Fourth Avenue

centered in room areas; bath room wall outlet heights incorrectly located for good mirror illumination; entrance bracket outlets so placed that ornamental lanterns often hide ornamentation of store archway keys; switches improperly connected to outlets, particularly stair hall units; switches hidden behind doors.

NEW OFFICERS ELECTED

Officers of the Los Angeles, Calif., Electrical Contractors Association for the year 1937 have been announced as follows: A. L. Stone, president; H. L. Evans, vice-president; F. R. Ulbrick, treasurer; J. J. Newitt, secretary, and George DeAth, L. W. Mills, J. E. Chandler and S. F. Hill, directors.

The association announced a collection service which is now being made available to members, as well as an arrangement for medical service for members and their employees upon a very nominal basis.

■

The Master Electricians' Association of Boston, Mass., has elected officers for 1937 as follows: Fred Dudley, president; Robert Black, vice-president; George W. McShane, secretary; and A. F. Kennedy, treasurer.

NEW YORK FARM STANDARDS

Seeking to improve the standards for farm wiring installation, about 1000 contractors in New York State have conferred with farm groups, according to Rural Electrification News, in a desire to cooperate with rural electrification projects. Professor L. D. Kelsey, advisor to the State Farm Light and Power Committee, asserts that there are still a great many contractors who are not installing the kind of a job best fitted to the farmers' needs.

MOTOR FACTS FOR SHOPMEN

Motor Specialists and winders will find practical information on windings and connections for a.c. motors of all types in the book "Connecting Induction Motors," by A. M. Dudley. The author reduces to arithmetic a set of carefully detailed, step by step, methods for calculating the performance of a motor from its dimensions and the proposed winding.

The popular subject of reconnecting on old winding for new conditions and other familiar subjects comprise the twenty chapters that discuss the everyday problems of the motor service shop. For example: How to figure a new winding for an old core; Locating faults in induction motor windings; Standard group diagrams from 2 to 14 poles, and eleven double-page wave diagrams for three-phase stators. Other chapters cover rotating magnetic fields; making "stair-step" pictures of the profile of the magnetic field; chorded windings; single-phase windings, and other worthwhile a.c. motor design and repair data. "Connecting Induction Motors", (Third Edition), A. M. Dudley, M. S., E. E., $3.50, 236 pages, 6 x 9, 2266 illustrations. McGraw-Hill Book Co., Inc.

BONDING DISCONTINUED IN BUFFALO

Bonding companies have collected an annual premium from electrical contractors of Buffalo, N. Y., for about ten years, without being called upon to settle a claim. A $2,000 bond had been required at a cost of $20 per year, in addition to a license fee of $100 for the first year and a $50 annual renewal fee.

The Niagara Frontier Electrical Contractors Association of Buffalo presented this condition for revision and the bond requirement has been eliminated entirely. This association has for three years been working also for a reduction in electrical inspection fees, and as a result, the New York Fire Rating Organization has issued a revised schedule of electrical inspection fees, which became effective November 1.

SUNSHINE FOR WALL STREETERS

In the midst of Manhattan's shadowy financial district, Artie McGovern, famous trainer, has gone into the business of furnishing artificial sunlight in a big way. At this million-dollar health center, the gymnasium proper has been completely equipped with sunlamps, representing the largest single installation ever made. In the hot room, where the temperature hovers around 140 deg. F., the beneficial sunlamp rays help to create a tropical atmosphere. Wiring by Fischbach & Moore, Inc.

Manmade Tropics—Takes fat off financiers.

RANGE OUTLETS

These quickly-wired Outlets and Caps help you keep step with the quickening pace of residential building and electric range installations. *Straight-in wiring* with solderless connectors ensure fast, easy hook-ups. . . The Flush Receptacle No. 7990 takes standard 4" wall box and standard 2-gang raised switch cover. Receptacle is of Bakelite; plate is standard brush brass finish with ground slots and contacts. Sets flush in the wall, out of the way in modern partitions. Rating: 50 Amperes, 250 Volts.

Surface Range Outlet No. 7950 is of polished black Bakelite; provides for straight-in wiring and solderless connections. The 90°-angle Cap (in center, above) matches the Outlet in material, in design and wiring features; suitable also for the Flush type Receptacle. Ground straps on cap connect with ground clamp on Receptacle, making easy, secure ground connections. The built-in cable clamp eliminates awkward right-angle cable connections. This Cap (No. 7952) is adapted for use with 3-wire range connections.

SOLD THROUGH YOUR **ARROW ELECTRIC DIVISION** ELECTRICAL WHOLESALER
THE ARROW-HART & HEGEMAN ELECTRIC CO. HARTFORD, CONN.

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News of N.E.C.A.

EXECUTIVE COMMITTEE MEETS JAN. 18-20

The Mid-Winter Meeting of the N.E.C.A. Executive Committee will be held at the National Headquarters in New York City on Monday, Tuesday and Wednesday, January 18th to 20th. A full attendance of all Divisional Executive Committeemen is expected at this meeting, at which plans for the 1937 National program will be developed.

Legislative measures will undoubtedly be passed by Congress at its next session for the regulation of industrial activities and to encourage fairer competition. These possibilities require earnest consideration and a program whereby the electrical contracting industry will be prepared to act promptly and intelligently as such legislation comes.

RECOMMENDATIONS TO ELECTRICAL COMMITTEE

N.E.C.A. representatives on the Electrical Committee, N.F.P.A., have requested that both individual electrical contractors and local associations of electrical contractors act promptly upon any recommendations which they desire their representatives to submit for consideration at the coming meeting of that committee to be held in March. Such recommendations should be addressed to the National Headquarters Office and will be referred to the Electrical Committee member responsible for the Article Committee under which such recommendations fall.

The N.E.C.A. representatives on the Electrical Committee, N.F.P.A., are—Allan Coggeshall and Theo. H. Joseph, New York City; George Andrae, Milwaukee, Wis., and W. L. Fowler, Cedar Rapids, Ia.

SURVEY OF OPERATING COSTS

Arrangements have been completed by N.E.C.A. for conducting a nation-wide survey of operating statements of electrical contractors for 1936. Special forms have been prepared to cover the special characteristics of the electrical contracting business from which an analysis of operations may be obtained to show average operating costs of overhead based upon net sales billed, prime costs of sales and productive labor.

N.E.C.A. has conducted these surveys of operating costs annually for many years, but discontinued the surveys during the business depression as it was felt that any general averages obtained under such abnormal conditions would be misleading and of little value. Since 1936 has seen a return to more normal conditions, it is expected that the survey now being made will present a valuable guide to business operations under present conditions.

NEW WIRING HANDBOOK FOR LOCAL PROGRAMS

N.E.C.A. has arranged for the purchase of sufficient copies of the Handbook of Interior Wiring Design, which has been prepared by a joint Industry Committee, to place a copy in the hands of each member of the National Association. Copies will also be furnished to the secretaries of all N.E.C.A. Chapters with the recommendation that the Handbook be made the basis for a program of study at local Chapter meetings.

Local associations of electrical contractors which are not under charter as Chapters of N.E.C.A. are requested to advise the Headquarters Office of the National Association of the name and address of their President or Secretary. N.E.C.A. will furnish this new Handbook on Interior Wiring Design for similar group study in the meetings of their local associations.

STANDARD SYMBOLS FOR WIRING PLANS REVISED

The standard symbols for wiring plans, developed under the joint sponsorship of N.E.C.A., A.I.E.E. and A.I.A., and approved as American standards by the American Standards Association in 1924, are in process of revision under a new A.S.A. Sectional Committee on Standardization of Graphical Symbols and Abbreviations for Use on Drawings. G. M. Sanborn, who was Chairman of the original committee sponsoring this project in 1924, represents N.E.C.A. on the special A.S.A. committee responsible for this new project which will be entitled Electrical Symbols for Architectural Plans.

The revised symbols have been prepared by a sub-committee in connection with the preparation of the Handbook of Interior Wiring Design, on which Allan Coggeshall of New York City has been representing N.E.C.A. The re-

35 Years Ago

Baltimore's wage agreement calls for a 9-hour day at $3 per day, with time-and-one-half for work done before 7 A.M. and after 5:30 P.M.

■

An architect protests placing panelboards near stairs at center of corridor to make circuits shorter — wants panels at end of halls—does not propose to have any short-circuits in his building.

■

Owners experiencing trouble in maintaining electric plants because materials and equipment not standardized. Too many dynamos and other equipment being built special for consulting engineers. They cannot obtain replacements.

■

Some products of 1902: "G. I." panelboard with removable enclosed fuse carrier: J & M auxiliary contact knife switches; T & B universal telescopic type A conduit boxes; P & S porcelain plug fuse cutouts; Sprague Electric Co. "conduits for use in all climates and under all conditions."

■

Seven mustached N.E.C.A. directors — including J. C. Sterns, Buffalo; F. E. Newberry, St. Louis; J. K. How, Baltimore; M. S. Barnes, Troy; E. McCleary, Detroit; James Hilton, Syracuse, and H. A. Loeb of Philadelphia.

■

The items appearing above are all taken from "The National Electrical Contractor" of January, 1902, published by the National Electrical Contractors' Association.

vised symbols have already been submitted by letter ballot to the members of the A.S.A. Committee on Standardization of Graphical Symbols, and approval is expected to permit of the publishing of the new symbols as a part of the new wiring handbook to be released in January.

PRESIDENT PEAK IN MISSOURI AND KANSAS

President Earl N. Peak, accompanied by Harry C. Evans, Executive Committeeman for Division 7, Kansas City, attended a series of meetings held in Missouri and Kansas during the week of November 30th to December 4th. Local industry meetings in Kansas City on November 30th and December 3rd, and in St. Louis on December 1st, were held under the auspices of the local N.E.C.A. Chapters. President Peak presented the program of the National Association and the movement for industry coordination under the Electrical Industry Promotion Committee of which Mr. Peak is Chairman.

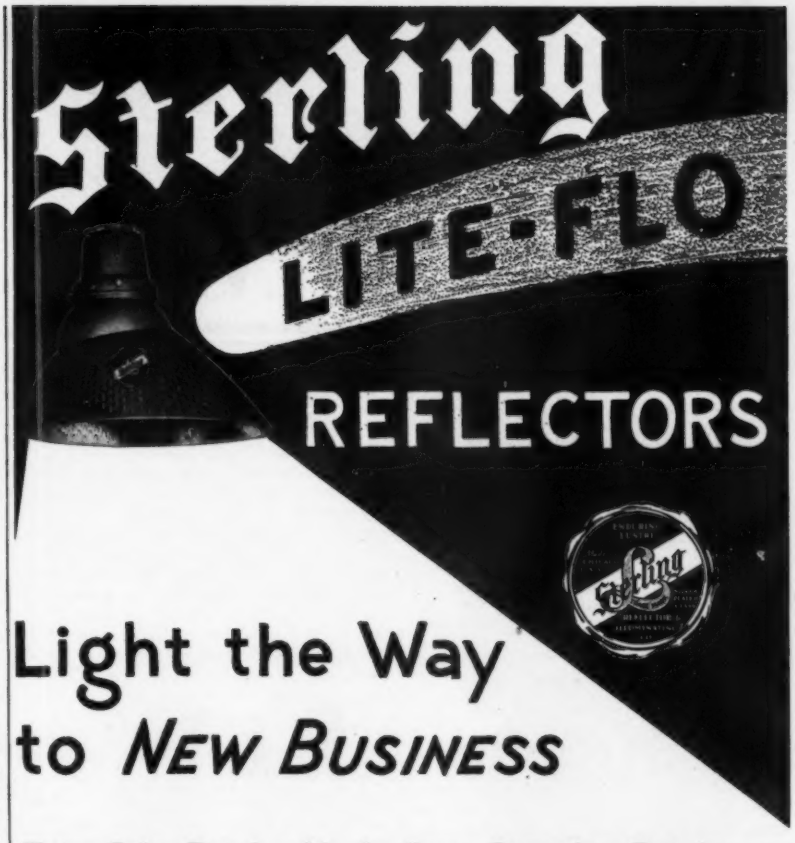
At Wichita, Kansas, on December 2nd, a State Convention of the Kansas Electrical Contractors Association was addressed by President Peak. This Kansas convention was attended by a large number of Kansas contractors and a constructive program of state activities was planned to be carried out under the leadership of their State President, J. W. Jenner of Wichita. Ten applications for National membership were received from the Wichita meeting and application for a charter for the Wichita Chapter, N.E.C.A., has also been filed at the National Headquarters.

THOLEN CHAIRMAN, NATIONAL MOTOR SECTION

Hans H. Tholen, President of Tholen Electric Company, Milwaukee, Wis., has been appointed Chairman of the National Motor Section, N.E.C.A. He succeeds J. R. Stolzenbach of Baltimore, who has served in that capacity for a number of years.

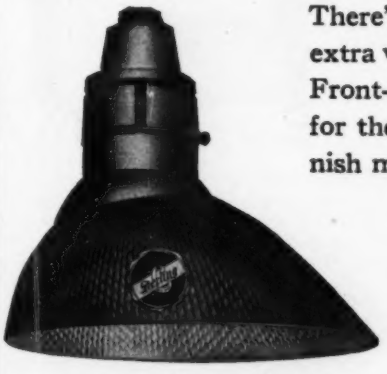
Mr. Tholen has been active in the development of the local organization of motor specialists in Milwaukee and is keenly interested in the development of the motor specialists interests nationally. Organized groups of motor specialists throughout the country are requested to file with Mr. Tholen the names and addresses of their officers, with whom he can correspond in the development of the National Motor Section program.

Material for this department is supplied by the headquarters staff of the National Electrical Contrs. Ass'n, 420 Lexington Ave., New York, N. Y.



Light the Way to *NEW BUSINESS*

Extra Sales Punch with the Same Operating Cost has an irresistible appeal to merchants and display men! That's why **Sterling** Lite-Flo Reflectors and **Sterling** Front-Line Lighting are creating sales—stepping up show window lighting business for the electrical trade.



The Sterling Line includes complete equipment and service for every display lighting requirement.

There's BIG OPPORTUNITY for extra volume and profit in **Sterling** Front-Line Lighting NOW. Write for the complete story. Let us furnish modernized lighting plans that multiply sales appeal with the same current—the same operating cost. It's the key to new business from old and new commercial customers.

REFLECTOR & ILLUMINATING CO.
1435 West Hubbard St. Chicago, U. S. A.

Equipment NEWS

Floated Blower Drive

A sound and vibration dampening device known as "floated drive bracket" intended for use on Ilg direct-connected blowers in those installations where extraordinary precautions must be taken in the maintenance of unusual quietness of operation. The motor bracket is mounted

on a second floating bracket which is insulated from the blower housing to which it is secured by flexible rubber cushions. Ilg floated drives can be obtained as original equipment on type B or type BC direct-connected Universal blowers, or can be mounted on any of these blowers already out in the field. Ilg Electric Ventilating Co., Chicago, Ill.

■

Low Mounting H.I.M.V. Reflector

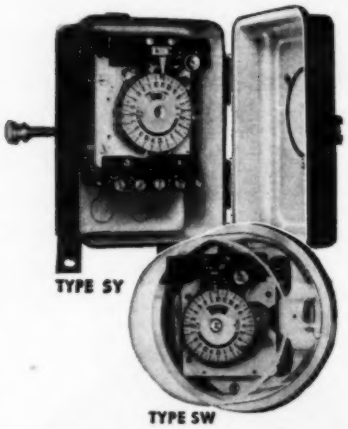
A dome type reflector for general industrial lighting designed for use with the 400-watt H.I.M.V. lamp. Equipped

with a monax glass cylinder which surrounds the lower portion of the lamp, it provides a 72½-deg. angle of cut-off and is designed for mounting heights of 10 to 18 ft. The monax glass cylinder is supported by three steel cadmium plated supports from the top portion of reflector. Lamp or collar or both may easily be removed without removing supports. Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa.

■

Time Switches

Sauter synchronous motor time switches in 4-amp. or 50-amp. sizes for use on 110 or 220-volt a.c. circuits. Type SY employs an all-metal housing, while

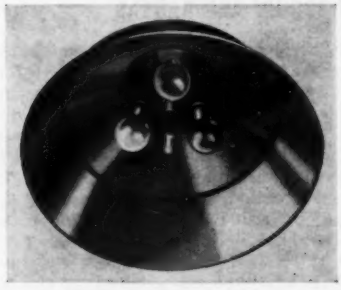


type SW is designed for mounting in a standard meter socket. Plain or astronomic dials are available. Vernier time adjustments are claimed to permit switch settings being timed within one-half minute. R. W. Cramer Co., New York, N. Y.

■

Mercury-Mazda Reflector

A combination 250-watt mercury-mazda lighting unit for industrial lighting where color correction is necessary. Designed for mounting heights of 8 to 18 ft., these units employ two distinct circuits, one to control the mercury lamp, and one to control the mazda lamps. The design is such as to allow three 60-watt, three 75-watt or three 100-watt mazda lamps to be used without interfering with the restarting of the mercury lamp in case of a voltage interruption. The unit consists of an Alzaked aluminum reflector, with socket assem-

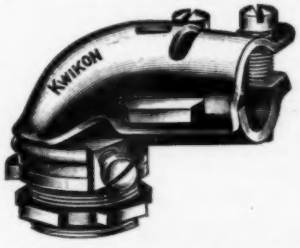


bly and a monax diffusing hinged glass bowl. Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa.

■

Swivel Box Connector

A connector for armored cable and other flexible wiring assemblies which may be rotated to any desired angle after

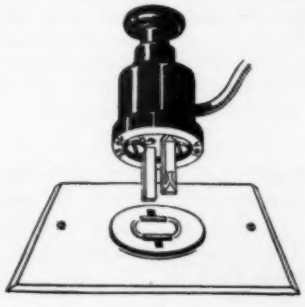


it has been installed without having to loosen a locknut inside of the outlet or device that is connected. The Kwikon swivel connector has a rigid threaded shank upon which a swivel body is assembled. This swivel body may be secured at the desired angle by means of a set-screw outside the outlet or device. Kwikon Co., Chicago, Ill.

■

Wedged-Contact Plug

An attachment plug for portable cords which employs a rubber plunger or ram for wedging the contact prongs against



the receptacle contacts after the plug has been inserted. An auxiliary bayonet wedge is actuated by the plunger to slide alongside the prongs into the receptacle. Wedgelock plugs are claimed to prevent cords from being disconnected from worn or loose receptacles. Hy-Duty Products Co., Los Angeles, Calif.

■

Midget Safety Switch

For use on oil burners and other ap-

plications, a line of front operable general purpose type D safety switches that are extremely small in size. Available in two-pole NEC and plug fuse types, also two and three-pole solid neutral. Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa.

■

Threadless Ground Clamp

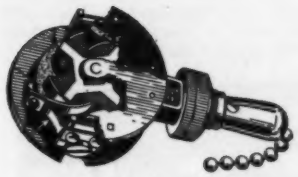
Hartman ground clamps are designed to receive unthreaded grounding conduit at any desired angle. Connected to water pipes by means of U-bolts that range in sizes to fit ½-in. to 6-in. water pipe. A split notched-wall hub is used for clamping the conduit that contains the grounding conductor. One type of U-bolt takes ½-in., ¾-in. or 1-in. pipe, while the hubs

are made in ½-in., ¾-in. and 1-in. conduit sizes. B. Hartman, Long Beach, Calif.

■

Heavy-Duty Fixture Switch

The heavy-duty Levolier fixture and canopy switch is rated 10 amp., 125 v., for controlling up to 1000-watt gas-filled lamps from the fixture canopy or outlet box. Said to be the smallest

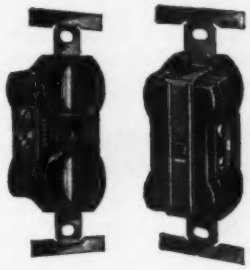


10-amp. switch made, it measures 1¾ in. diam. and ¾ in. thick. It is available in three stem lengths and with a link for placing the switch in the fixture chain. McGill Manufacturing Co., Valparaiso, Ind.

■

15-Amp. Duplex Receptacle

A line of all-bakelite duplex receptacles for all-purpose use, made in three styles. All are rated 15 amp., 125 v., 10 amp., 250 v. The No. 4832 is for standard twin-outlet use, No. 4832-X has separate circuit terminals feeding each outlet, while No. 4832-Y has separate terminals for two ungrounded "feed" conductors, and a



common terminal for the grounded conductor. Other features of design are: double-sided spring contacts; large-headed long-shank binding screws, two on each line side, that will accommodate two No. 10 conductors; slot-finding boss; all-bakelite body; strong mounting yoke, and wide mounting ears. The Bryant Electric Co., Bridgeport, Conn.

■

Close-Focus Lamp

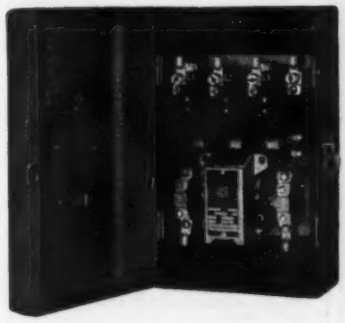
Unifocal industrial lamps used to reflect light rays into a converging beam which brings the light to a focus about 15 in. ahead of the reflector. Designed for localized industrial lighting where uni-

form and intensified illumination is desired for a restricted area. Alzak spun aluminum reflectors of special design are said to be effectively shielded to eliminate glare from the bright light source. A supporting arm having socket joints permits easy adjustment of angle or direction of light. The Fostoria Pressed Steel Corp., Fostoria, O.

■

Automatic Starter

Line-voltage type starters for remote operation of a.c. motors from 7½ to



25 h.p. Known as Type T, Class 8536, their design permits the quick replacement of the magnet assembly, stationary and moving contacts, and the thermal relays. Accessibility for periodic inspection, vertical closing action, compactness yet ease of access for wiring are further features of design. Square D Co., Industrial Controller Division, Milwaukee, Wis.

■

Adjustable Ground Clamps

Type GC malleable ground clamps can be attached to ½-in. to 2-in. water pipes that are closely secured to the surface by means of a single bolt. The GCSC

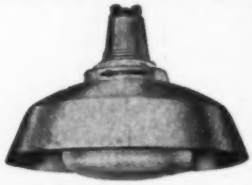
fitting provides a combination hub to take ½-in. or ¾-in. conduit. Solderless connection types are available to take solid or stranded bare ground wires or armored ground wires. Type GCCS is a flexible ground clamp which has an 8-in. copper strap connecting between the water pipe fitting and the conduit hub. Killark Electric Mfg. Co., St. Louis, Mo.

■

Door Chime

Electro door chimes are said to fit practically the same space as a door bell and are recommended for new or existing residences, apartments, offices or other applications. Designed to operate on a transformer or on dry cells, and said to be easily installed to operate

MULTI
REFLECTORS



Glassteel Diffusers are ideal for correct light distribution in factories and plants of all kinds. No danger of breakage from vibration and expansion because the glass globe is held by a MULTI "Gripit" holder with internal finger support. They are made of Armco Ingot Iron porcelain enameled white inside and outside and are available in all standard types and sizes.

MULTI Industrial Reflectors are made in hundreds of sizes and types to meet the varied demands of industrial establishments for efficient and correct lighting. They do not crack or chip, are rustproof and are easily cleaned. Specify MULTI reflectors for all your new and replacement work. A catalog of the complete MULTI line will be sent gladly.

MULTI ELECTRICAL MFG. CO.
1840 W. 14th St., CHICAGO

FEB.
15th

An Important Date for Electrical Manufacturers

(See page 56)

from the present wiring. No moving contacts are employed. The single-stroke signal is operated by a solenoid-actuated plunger striking the chime bar,

which produces a musical tone that is said to be audible throughout the average residence. Finished gray or ivory with cadmium plated chime bar. Schwarze Electric Co., Adrian, Mich.

■

Light-Weight Jackhammer

Designed for drilling and trimming in concrete and rock, the "JA—30 Jackhammer" in the dry drilling model

weighs only 30 lb. Claimed to require only a small amount of air, to give high drilling speed and to be easy to hold and handle. Accommodates a wide range of jackbits. Ingersoll-Rand Co., Phillipsburg, N. J.

■

Rubber-Hook Lamp Guard

A solid rubber handle used with No. 650 portable lamp guards is featured

as providing greater safety and as reducing lamp and guard breakage. This guard has two hooks, one of hand molded rubber with a steel core, while the socket section of pliable molded rubber is vulcanized to the hook. Available in

The new and completely revised **BUYERS REFERENCE NUMBER FOR 1937** was delivered with the December issue of ELECTRICAL CONTRACTING

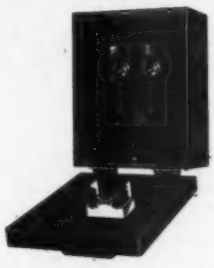
Use your copy to save TIME and MONEY in 1937

keyless or levolier socket types in sizes to accommodate from 25 to 100 watt lamps. McGill Manufacturing Co., Valparaiso, Ind.

■

Door-Operated Safety Switch

For single or banked installations of service entrance equipment with or without branch circuits, the "3800" line of safety switches is claimed to simplify



continuous banking. Side walls of cabinets are removable and sides of cabinets will telescope to permit adding other units. The switch is operated by a hinged main door by means of a large-grip handle. Porcelain is used for the switch and fuse blocks, with all wiring terminals on the face. The Wadsworth Electric Mfg. Co., Inc., Covington, Ky.

■

Multi-Breaker Panelboard

Nofuze circuit breaker panelboards for general 115, 115/230 volt a.c. distribution with branch circuits ranging from 15 to 50 amp. capacity, for application in industrial plants, buildings, schools, hotels and all types of com-

mercial structures. This line uses multi-breaker units in a range of 4 to 40 circuits in 2-circuit steps. Bus arrangements are provided for single phase, 3/2-wire, and 3-phase 4-wire services.

Branch circuit ratings of 15,20,25, 35 and 50 amp. are available. These units permit a compact design, the box dimensions being held to 15 in. wide by 4 in. deep, permitting mounting in spaces where other panels could not be used, such as the face of columns. Westinghouse Electric & Manufacturing Co., East Pittsburgh, Pa.

With the MANUFACTURERS

Charles LeGeyt Fortescue

Dr. Charles LeGeyt Fortescue, consulting transmission engineer of the Westinghouse Electric and Manufacturing Co., died in his home at Pittsburgh, Pa., on December 4, after a lengthy illness. Dr. Fortescue was internationally famous for his work in curbing the effects of lightning on transmission lines and distribution systems. Nearly 200 patents were credited to him covering a wide range of research, product development and protective devices, including the design of the first 100,000-volt transformer for commercial service. Born in York Factory, Canada, November 7, 1876, he received his earlier education in England.

*

Edwards & Co., New York, N. Y., has purchased a site in Norwalk, Conn., and will shortly erect a factory with 80,000 sq. ft. of floor area on that property.

*

Leland D. O'Connell has been appointed manager of the Denver, Colo., office of the Westinghouse Electric Mfg. Co. Mr. O'Connell joined the company in 1919. In 1931 he was made manager of Westinghouse's Tulsa, Okla., office and was later promoted to manager of the industrial division of the company's Southwest District with headquarters in St. Louis, Mo., after which he was brought to headquarters.

*

Copperweld Steel Co., Glassport, Pa., announces the appointment of Roy C. Raasch as field representative with headquarters at Chicago, Ill.

*

W. F. Holtzman has been appointed manager of the Rawlplug Washington Co., with headquarters at 50 Florida Ave., N. E., Washington, D. C.

*

Belden Manufacturing Co. announces a building program amounting to more than $120,000, which has been found necessary to increase the manufacturing facilities in its Chicago, Ill., and Richmond, Ind., plants. Approximately 20,000 sq. ft. of floor space has been added at Chicago and 35,000 sq. ft. at Richmond.

William J. Jockers has been appointed assistant sales manager of the Diehl Manufacturing Co., electrical division of The Singer Manufacturing Co., with headquarters at the factory, Elizabethport, N. J.

*

New Data Available

Industrial Micarta: A booklet illustrating industrial applications of Micarta, listing mechanical and electrical properties, the standard forms available such as sheet, rods, tubes, angles, channels, specially molded pieces, etc. Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa.

*

Farm Wiring: "Wiring Your Farm and Home", a 12-page bulletin for the farmer explaining the applications and need of complete wiring and the importance of employing a competent contractor. Rural Electrification Administration, Washington, D. C.

*

Solderless Connectors: Catalog No. 36, twenty pages, covers front lugs, various angular and off-set types; two-way, three-way, and crosses; stud and cable connectors, and miscellaneous tap lugs, all for solderless connections in conductor sizes up to 2,000,000 c.m. Frankel Connector Co., Inc., New York, N. Y.

*

Farm Electrification: Bulletin B.2071 entitled "Wired Help for Farm and Home" suggests by illustrations, charts and wiring layouts, the uses for electrical equipment on the farm. A schedule of wiring for the farm home is included together with 140 listings of how electricity serves the farmer. Westinghouse Electric and Mfg. Co., East Pittsburgh, Pa.

*

Simplified Motor Manual: A 48-page book, "Electric Machinery Catechism" containing an explanation of 144 common questions regarding motors and

UMI

The easiest way to get ahead in electricity—

through the other man's experience as found in books

Whatever "getting ahead" means to you as an individual, there is no principle so important as backing up your brain with the other man's experience. Why spend time and effort to find out what has already been learned and put down for all to see in books? Here, for instance, are all the results of a rich experience in every stage of wiring, installation and contracting work gathered and set down for you in

Terrell Croft's

AMERICAN ELECTRICIANS' LIBRARY

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In six really magnificent volumes this library gives the most thorough, most complete and easiest-to-understand treatment of the more specialized phases of electrical practice in print today.

"How" and "why" for Maintenance Men

The books show the best ways to make installations for every type of conduit wiring job—they tell how to handle every kind of lighting and switch problem—they give tips on short-cuts for saving time on routine jobs—they show the quickest and surest methods of locating and remedying circuit troubles. Alternating current armature winding, electrical machinery control diagrams and machinery erection are some of the things covered in detail.

Diagrams

In all, these books contain more than 1,000 clear, easy to follow diagrams, with wiring instructions written in simple language. It is unnecessary to tell you how valuable is this one feature alone.

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You may examine these books free for 10 days by sending the coupon below, filled out. In addition, if you decide to keep the books you have the privilege of paying for them in easy monthly installments while you use the books. Make sure you are not passing up your best bet for getting ahead. Mail the coupon today.

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Send me Croft's American Electricians' Library, 6 volumes, for 10 days' free examination. If I find the books satisfactory, I will send you $1.50 in 10 days, and $2.00 a month until $17.50 has been paid. Otherwise I will return the books postpaid.

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(Books sent on approval in U. S. and Canada only.)

circuits, for those who do not have an extensive knowledge of electrical phenomena or terminology. Drawings, photographs, sectional views, wiring diagrams and tables are included. Fairbanks, Morse & Co., Chicago, Ill.

*

Air-Operated Controllers: An explanation of operating principles of Brown air-operated controllers for the control of temperature, pressure, flow and liquid level. Catalog No. 8901, 32 pages. The Brown Instrument Co., Philadelphia, Pa.

*

Floodlights: Catalog No. 316 covering floodlights in closed, open, underwater and special types; searchlights and various lighting accessories, all arranged in loose-leaf tabulated sections. Installation suggestions and calculation data are conveniently segregated under separate sections. Crouse-Hinds Co., Syracuse, N. Y.

*

"Industrial Survey Guide": A suggested procedure for anlyzing wiring conditions in industrial plants. It contains blank entry forms for listing feeders and circuit layouts, sample wiring layouts, also check lists for reporting the existing condition of general plant wiring and equipment. Publication No. C-34, Anaconda Wire & Cable Co., New York, N. Y.

*

Lead Covered Cable: Bulletin GEA-2355 describing the hydrogen process for applying lead sheath to insulated cable. General Electric Co., Schenectady, N. Y.

*

Arc Welding: An illustrated 20-page bulletin No. 412 entitled "The New Arc Welding Technique" which discusses Lincoln arc welders and controls in various fields of application. The Lincoln Electric Co., Cleveland, O.

*

Lugs and Splicing Sleeves: Bulletin Form 528 covers copper soldering lugs and splicing sleeves. Wolverine Tube Co., Detroit, Mich.

*

Wiring Devices: A folder describing the No. 4832 line of all-bakelite duplex receptacles. Bryant Electric Co., Bridgeport, Conn.

*

Bin and Stack Lighting: Leaflet describing luminaires for lighting book aisles, stock room bins, etc. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

*

Soldering Hints: Folder S24 contains hints on expert soldering and on the care of the Stanley electric soldering iron. Stanley Tools, New Britain, Conn.

*

V-Belt Sales Book: An informal 40-page book, "The ABC's of V-Belts" for distributor salesmen, which gives non-technical explanations and illustrations about V-belt principles and uses. The Dayton Rubber Mfg. Co., Dayton, O.

*

Bronze Bearings: A catalogue of graphite bronze bearings which lists inside and outside diameters and lengths of all standard bronze graphite bushings and sheave bearings. Randall Graphite Products Corp., Chicago, Ill.

*

Motor Starters: Bulletin GEA-1522C on manual motor-starting switches, type CR1062. General Electric Co., Schenectady, N. Y.

*

Sign Transformers: Folder describing neon transformers for small display signs. Acme Electric & Mfg. Co., Cleveland, O.

*

Industrial-Commercial Lighting: The complete Ivanhoe line of industrial and commercial lighting equipment is included in separate sections of catalog No. 903. Standard reflectors, vapor-proof, color matching, mercury vapor, special shapes and accessories are included together with engineering data for various types of installation. The Miller Co., Meriden, Conn.

*

Circuit Breakers: A 16-page bulletin covering the "Bulti-BreakeR" line of small circuit breakers for domestic and small commercial buildings. Square D Co., Detroit, Mich.

*

Antenna Systems: An installation manual which describes the Taco master antenna system for apartment houses, hotels and other buildings. Technical Appliance Corp., New York, N. Y.

*

Armored Cable: Hazard armored cable, employing rip-cord for quick sheath stripping, is described in an 8-page bulletin. Hazard Insulated Wire Works, Wilkes-Barre, Pa.

*

Profit Sharing Data: A description of different types of profit sharing plans, outlining their historical background, with discussions of their purposes and theories. "Sharing Profits with Employees". Policyholders Service Bureau, Metropolitan Life Insurance Co., New York, N. Y.

*

Electrical Specialties: A 1936–37 catalog of 40 pages covering the Eagle line of wiring devices, sockets, brush kits, lamps, plug caps and other products. Eagle Electric Mfg. Co., Brooklyn, N. Y.

*

Specialized Lighting Equipment: Catalog No. 36 covers a wide selection of built-in controlled lighting, troughs, coves, indirect wall and torchere units,

general architectural designs and other specialties. Garden City Plating & Mfg. Co., Chicago, Ill.

*

Rotary Converters: For converting d.c. current to a.c. for the operation of radios, amplifiers, gaseous signs, etc. Bulletin No. 13-1 describes the Janette line. Janette Manufacturing Co., Chicago, Ill.

*

Motors: Leaflet describing type SK d. c. motors designed to withstand internal gas or coal dust explosions. Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

*

Rolled and Drawn Connectors: Publication C-8 describes how to make conductor splices with rolled and drawn seamless connectors on circuits from No. 12 to 350,000 cm. Anaconda Wire & Cable Co., New York, N. Y.

*

Lighting Equipment: A listing in colors of the best sellers in its line. Catalogs No. 37 and 37-S covering residential units, and 37A, commercial units. Moe Brothers, Milwaukee, Wis.

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Resistance Welding: "Theory and Application of Resistance Welding", a bulletin composed of reprinted articles on this subject. The Electric Controller & Mfg. Co., Cleveland, O.

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Remote Controls: Remote control switches, relays and momentary contact switches are covered in bulletin No. 10-B. Hart Manufacturing Co., Hartford, Conn.

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H.I.M.V. Lighting: Miller "Mer-Tung" equipment, for use with combination mercury vapor-mazda lighting systems in stores and offices. Catalog No. 888. The Miller Co., Meriden, Conn.

*

Arc Welders: Bulletin No. 314 covering Lincoln Model SA 150 arc welders ranging from 45 to 200 amp. capacity. The Lincoln Electric Co., Cleveland, O.

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Machine Lamps: Folio M.L.-2, 12 pages, covering Fostoria adjustable machine lamps, in two and three-joint models; also special bench models, brackets and bases. The Fostoria Pressed Steel Corp., Fostoria, O.

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Power Transmission Data: A combined catalog of 40 pages with complete data and prices on Cog-Belt drives, Cog-Belt drives with Day-Steel pulleys, and V-Flat drives. Drives from fractional to 1000 hp. and over may be easily selected from tables that include more than 22,000 standard drive applications. Catalog No. 180, The Dayton Rubber Mfg. Co., Dayton, O.

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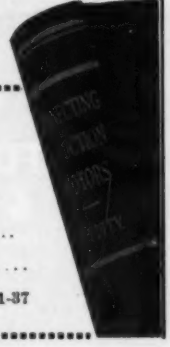

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